The Chemical Age

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The Chemical Engineering Congress

"NOW sits expectation in the air." The Chemical Engineering Congress of the World Power Conference opens on Monday and the months of long preparation will come to fruition. An astonishing amount of hard work goes into the making of a successful conference, and the more so when it is international in character.

The good host turns first to welcome his guests, so we, before sitting down to the feast, greet our foreign visitors. All, whether chemists, physicists or chemical engineers, belong to that vast brotherhood of science that will one day prove more potent than international boundaries, and that is bringing the nations closer together through interchange of views between kindred spirits to break down, in the slow course of time, the barriers of economic nationalism that are stifling the trade of the world. We all long to do business together, for this is *par excellence* a gathering of industrialists who live by trade. Though economic circumstances seem just now to forbid the free interchange of goods, yet scientific men can, and do, indulge in free interchange of technical information and of scientific thought. This congress, in which no less than two-thirds of the papers are contributed by authors outside the British Empire, is the surest proof of that statement; no further demonstration of the catholicity of science is needed.

It has been declared on the highest scriptural authority that a little leaven leaveneth the whole lump; scientific and technical men are the leaven of the world, a leaven that is even now working and that will one day make sweet the whole body politic. So we welcome our visitors to London, a city that so long ago as 1617 was styled "the dining room of Christendom," and that has ever had a welcome for all. It is a city of curious contrasts of which Byron, that internationalist among poets, said to his friend: "Thou are in London—in that pleasant place, where every kind of mischief's brewing." Dr. Johnson in an earlier day had remarked upon the mischief: "Prepare for death if here at night you roam," he declared, "And sign your will before you sup from home." London is no city of mischief to-day and a hearty welcome awaits every guest from whatever country he or she may come. A special greeting may be added to those who come home from the Empire.

The conference itself bids fair to be among the most successful ever held. If our addition is accurate there are no fewer than 127 papers to be discussed, of which 44 are from Great Britain, five from Canada, 16 from the United States of America, eight from Japan and the remainder from various European countries. Chemical engineering is more important to-day than it has ever been; it spreads its roots into many industries that are not solely chemical industries, because it is to be found in greater or less degree wherever chemicals are used. The papers are divided into twelve sections in the course of which an astonishing range of subjects is discussed. The first section dealing with ferrous materials in chemical plant construction is of special interest to this country, which was the cradle of the world's iron and steel industry. It was here that Darby, in 1735, laid the foundations of modern blast furnace practice by using coke, where Cort developed the puddling process in 1784, where the Bessemer process was discovered in 1856, the Siemens-Martin process a little later, and the basic process of Thomas and Gilchrist in 1879, and the stainless steel of Harry Brearley no longer ago than 1912. Section B concerns the other materials used in chemical plant construction, such as rubber, plastics, non-ferrous metals and refractories.

Section C deals with the separation of materials by washing, filtering, distillation and the numerous other ways in which substances are separated in the chemical works one from the other. Grinding and mixing and electrolysis—at first sight strange bedfellows—occupy section D, and destructive distillation forms section E; it is curious that there appear to be no papers dealing with coke ovens, though the less important low temperature carbonisation is well covered. Lubricants and the disposal of effluents—again curious bedfellows—are allotted to section F. Section G comprises high pressure reactions and high vacua, a section where the greatest advances of recent years have been made. It is strange to reflect that 100 years ago steam boilers were confined to some 40 or 50 lb. pressure and often exploded! We in 1936 do not turn a hair at 500 atmospheres.

Education and training occupy section J and section K deals with administration, safety and welfare, the special province of the works management. General trends of development are grouped in section L, and the numerous miscellaneous subjects are allotted the last section, section M. These two sections are the most varied and have between them 13 papers each or 20 per cent. of the papers presented to the congress. It is a feast to excite the imagination; if the volume of literature is a little staggering, that is in truth a good fault. "Learn," said Cato of old, "but learn from the learned." The learned have come from the ends of the earth to teach us and we shall sit at their feet. Chemical industry throughout the world should benefit from this Chemical Engineering Congress.

Notes and Comments

Foremen as "Safety Men"

IN a recent paper, Dr. W. H. Garrett suggests that the foreman is the right person to take charge of the safety work of industrial organisations. The foreman is now chosen primarily for his mental ability and he is thus able to appreciate training in safety principles. He is in daily touch with his men and knows their idiosyncrasies; he has usually started life as a workman and therefore knows the job inside out. He is in intimate touch with the work of his department and is thus able to recognise what each job entails. Dr. Garrett holds that the foreman should be trained thoroughly in safety principles and that a set of rules should be drawn up for his guidance. When this has been done the foreman should be made personally responsible for every accident to the men under his charge unless it can be shown that an injury has been caused through someone acting contrary to explicit instructions received from the foreman; moreover, upon the third occasion upon which an injury happens for which the foreman can be blamed on this system he should be dismissed. One cannot help feeling that this is safety gone mad. Whilst the greatest care should be taken to preserve life and limb the job of the foreman is not akin to that of a nurse. Foremen whose gangs escape accident might be rewarded, and those whose gangs are more than usually subject to accident should be watched. But the management cannot expect to escape from its responsibilities so lightly. Management has its part to play in the psychological selection of workmen and in providing adequate safeguards.

The Age for Retirement

THE question of what should be the age for retirement has been exercising the minds of certain people recently because the end of the summer term is the time fixed for the vacation of University Chairs by those who are deemed too old to hold them. Universities customarily fix 65 as the retiring age; some large business houses fix as low as 60. There is a movement to give pensions to workers at 60 and to accompany these pensions by compulsory retirement. Unquestionably the tendency is to shorten the working life. It is frequently argued that because a man is capable of doing a little valuable research work after he reaches 60 or 65 it is wrong to retire him. The great majority of mankind are past their zenith by 60 and, though the judgment may be sound because taught by experience, there is customarily a slowness that ill consorts with industrial life. It is said that the aged keep the plums so long that when they fall into the waiting hands of the next generation they are rotten. Yet the old have their contribution to make to the welfare of the world. Might not an equitable solution be to retire all men at some defined age and to permit them to carry on work of an unpaid character. For example, the professor might, one would suppose, be glad to rest from teaching and to take up research work at his own speed and upon such subjects as interest him. Might not the business man be glad to rest from the turmoil of competitive life to spend his last remaining years in some congenial hobby? There is no greater fallacy than to suppose that only those whose names rank high in their own circle are able to carry on the world's work, science and art satisfactorily.

Purification of Benzole Motor Spirit

THE National Benzole Association, actuated by the desire to sell motor spirit that shall be not inferior to that imported by the petroleum companies, regard it as essential that not more than 0.4 per cent. of sulphur shall be contained in the finished spirit. The crude benzole from Derbyshire coals frequently contains between 1.5 and 2.0 per cent. of total sulphur. In an instance given by Mr. A. Gillies, B.Sc., in a recent paper to the Coke Oven Managers' Association, out of a total sulphur content of 1.7 per cent. 0.2 per cent. was H_2S, 0.8 per cent. was CS_2, and 0.7 per cent. was thiophene. The problem is to reduce this sulphur to 0.4 per cent. The H_2S is easily removed; it remains to decide whether to take out all the CS_2 and part of the thiophene, or all the thiophene and part of the CS_2. Mr. Gillies points out that 1 per cent. of sulphur by weight represents respectively 0.83 per cent. of CS_2 by volume and 2.18 per cent. of thiophene; consequently he recommends removing the CS_2. This is effected by one of three methods: fractionation, the methanol-soda process, and the Yorkshire Tar Distillers' method which uses ammonium disulphide in presence of NH_4OH. So far as can be traced we know of no proper-scale research in which the three methods have been compared under conditions which will admit of a decision in any given instance which to use. It is now known that thiophene is removed by washing with acid when it combines with the unsaturated compounds; but Mr. Gillies and the research chemists of the Association seem to differ in their views as to whether the low-boiling unsaturated bodies in the CS_2 fraction do or do not condense with thiophene.

Qualifications of a Chemist

THE current issue of the organ of the British Association of Chemists contains a review of the problem of what should be the professional qualifications of a chemist, based on the report of the Poisons Board. Whatever may be said about qualifications for specialised posts, there must be a good deal of sympathy with the views expressed by the Association. It is undeniably true that in medicine and in dentistry the qualifications laid down are the minimum and not the maximum. The Institute of Chemistry claims that for general work theirs is the highest possible qualification. We can imagine a vigorous protest from the Institute if, for example, it were to be suggested that no Fellow could be considered qualified to engage in research work until he had obtained the maximum research qualification, the D.Sc. The fact is, of course, that most "qualifications" as expressed by "letters after one's name" mean nothing more than that a defined course of study has been pursued and that the examinee has been successful in remembering those facts he had been asked to make use of in the examination. Papers published in THE CHEMICAL AGE have shown dissatisfaction with the lack of resource needed to answer examination questions as now set. Evidence of competency resides in the ability successfully to practice.

The Chemical Engineering Congress

To be Opened by the Duke of Kent on Monday

THE DUKE OF KENT has kindly promised to open the Chemical Engineering Congress of the World Power Conference at the Central Hall, Westminster, at 3.15 p.m. on Monday next, June 22. The Congress, of which Lord Leverhulme is president, will be held from Monday until Saturday, and the British Chemical Plant Exhibition will be held simultaneously in another part of the same building. Representatives of about fifty nationalities are expected to participate in the Congress. The full week's programme is given below.

Monday

11 a.m. Opening of the British Chemical Plant Exhibition.

12.30 for 1 p.m.—Exhibition luncheon, Hotel Victoria, Northumberland Avenue.

3.15 p.m. Official opening of the Chemical Engineering Congress, Central Hall, Westminster. Lord Leverhulme will preside and the Duke of York will open the Congress with an address.

9 p.m. Reception at the Dorchester Hotel, Park Lane, followed by dancing. Lord Leverhulme will receive the guests.

Tuesday

10 a.m. to 11.15 a.m. Section A: Ferrous Metals in Chemical Plant Construction. Chairman, Dr. J. R. Withrow (United States); vice-chairman, Sir William Larke; general reporter, Dr. W. H. Hatfield.

11.15 a.m. to 12.30 p.m. Section B: Refractories, Rubber, Plastics and Other Materials in Chemical Plant Construction. Chairman, Herr Dr. Dietz (Germany); vice-chairman, Professor S. G. M. Ure; general reporters, Mr. W. C. Hancock and Mr. M. B. Donald.

2.30 p.m. to 3.45 p.m. Section C: Separation. Chairman, Professor Dr. St. Pilat (Poland); vice-chairman, Sir Alexander Gibb; general reporter, Dr. A. J. V. Underwood.

3.45 p.m. to 5 p.m. Section D: Size Reduction, Grading and Mixing; Electrolysis and Electrical Applications. Chairman, Dr. A. W. G. Wilson (Canada); vice-chairman, Mr. W. R. Barclay; general reporters, Professor B. W. Holman and Dr. H. J. T. Ellingham.

7 p.m. for 7.30 p.m. Annual Dinner of the Institution of Chemical Engineers, Hotel Victoria, Northumberland Avenue, London.

The Right Honourable the Viscount Leverhulme, President of the Chemical Engineering Congress.

Wednesday

10 a.m. to 11.15 a.m. Section E: Destructive Distillation. Chairman, M. Baril (France); vice-chairman, Mr. S. Lacey; general reporter, Dr. F. S. Sinnatt, C.B.

11.15 a.m. to 12.30 p.m. Section F: Treatment and Disposal of Effluents and Waste Materials; Lubrication. Chairman, Professor Dr. Ir. H. I. Waterman (Holland); vice-chairman, Sir Robert Robertson, F.R.S.; general reporters, Dr. A. Parker and Mr. H. Moore.

Afternoon. Official Visits.

10 p.m. Reception by His Britannic Majesty's Government, Lancaster House, S.W.1. The Rt. Hon. J. Ramsay MacDonald, M.P. (Lord President of the Council) will receive the guests.

Thursday

10 a.m. to 11.15 a.m. Section G: High Pressure Reactions and High Vacua. Chairman, Dr. Yoshikyo Oshima (Japan); vice-chairman, Mr. J. H. G. Monypenny; general reporter, Dr. D. M. Newitt.

11.15 a.m. to 12.30 p.m. Section H: Heat Exchange. Chairman, Dr. A. B. Newman (U.S.A.); vice-chairman, Dr. H. Levinstein; general reporter, Mr. B. Heastie.

Afternoon. Official visits.

7 for 7.30 p.m. Official Banquet, Grosvenor House, Park Lane, London. The President, the Rt. Hon. the Viscount Leverhulme, will preside.

Friday

10 a.m. to 11.15 a.m. Section J. Education and Training. Chairman, Professor P. E. Raaschou (Denmark); vice-chairman, Mr. H. T. Tizard, F.R.S.; general reporter, Professor H. E. Watson.

11.15 a.m. to 12.30 p.m. Section K. Statistics; Administration; Safety and Welfare. Chairman, Herr Dr. Wolfgang Johannes Muller (Austria); vice-chairman, Dr. E. F. Armstrong, F.R.S.; general reporter, Dr. W. H. Garrett.

12.45 for 1 p.m. Luncheon at the Savoy Hotel, Strand, given by the visiting delegates to the British National Committee of the World Power Conference and the Organising Committee of the Chemical Engineering Congress.

2.30 p.m. Session of the International Executive Council of the World Power Conference at the Central Hall.

2.30 p.m. to 3.45 p.m. Section L: Trend of Development. Chairman, Dr. Harald Nordenson (Sweden); vice-chairman, Mr. W. A. S. Calder; general reporter, Mr. H. W. Cremer.

3.45 p.m. to 5 p.m. Section M: General Aspects. Vice-chairman, Dr. F. S. Sinnatt; general reporter, Professor W. M. Cumming.

9 p.m. Reception by invitation at Imperial Chemical Industries House, Millbank, followed by dancing. Buffet. Sir Harry and Lady McGowan will receive the guests.

Saturday

10 a.m. to 12.30 p.m. Reports on the technical sessions; Closing meeting: Sir Harold Hartley, chairman of the International Executive Council, World Power Conference, will preside.

Programme of Official Visits

The following official visits have been arranged for the benefit of members of the Congress:

WEDNESDAY

Purfleet Margarine Works, Ltd., Tilbury (refining and deodorising oils, manufacture of margarine, etc.).

Distillers Co., Ltd. (research department at Great Burgh).

George Kent, Ltd., Luton (measuring instruments and instruments of all kinds for control).

B. Laporte, Ltd., Luton (manufacture of peroxides, barium compounds and titanium pigments).

Chemical Research Laboratories of the Department of Scientific and Industrial Research at Teddington (high-pressure research, etc.).

Mond Nickel Co., Ltd., Acton (precious metals refinery—production of the platinum group of metals, silver and gold).

Imperial Paper Mills, Ltd., Gravesend (paper manufacture).

John Knight, Ltd., Silvertown (soap making, seed crushing, glue manufacture, tallow melting).

Kodak, Ltd., Harrow (packing of sensitive papers, camera and lens making, manufacture of photographic goods).

Union Oil and Cake Mills, Silvertown (extraction of vegetable oils).

Gas Light and Coke Company (Fulham Works).

Fuel Research Station, Greenwich.

Associated Portland Cement Manufacturers, Ltd., Kent Works, Stone, Dartford (manufacture of portland cement).

Imperial College, South Kensington (Department of Chemical Technology, including fuel technology and refractory materials, high-pressure gas chemistry, chemical engineering, electro-chemistry and general technology).

J. and E. Hall, Ltd., Dartford (refrigerating machinery, evaporators, condensers, etc., machinery under test).

United Dairies, Ltd., Wood Lane, Shepherd's Bush.

Whitbreads, Ltd., Chiswell Road, E.C.1 (technical and process work of brewing).

General Electric Co., Ltd., Wembley Works.

THURSDAY

South Metropolitan Gas Co. (chemical works).

Fuel Research Station, Greenwich.

University College, Gower Street, Ramsay Memorial Laboratory of Chemical Engineering.

Home Office Industrial Museum, Horseferry Road (exhibition of methods, arrangements and appliances for promoting safety, health and welfare in industry).

Fescol, Ltd., Grosvenor Road, S.W.1 (electro-chemical deposition, applications of the Fescol process).

Anglo-Iranian Oil Co., Ltd., Sunbury-on-Thames.

Pyrene Co., Gt. West Road (appliances for fighting fire, safety appliances).

J. Lyons and Co., Ltd., Cadby Hall, South Kensington.

United Glass Bottle Manufacturers, Ltd., Charlton Works.

General Electric Co., Ltd., Hammersmith Works.

Shell-Mex, Ltd., visit to the Central Laboratory, Fulham, followed by a visit to the Lensbury Wharf (distributing centre) and, if time permits, to the motor repair centre.

Visit to historical, antiquarian and literary places in the City of London, arranged by courtesy of the London and Middlesex Archeological Society. Details can only be fixed when the numbers attending are known.

Very Low Temperatures Exhibition, Science Museum, South Kensington (illustrating methods of producing and utilising very low temperatures).

Whitbreads, Ltd., Chiswell Road, E.C.1 (technical and process work of brewing).

London Power Co., Ltd., Battersea Power Station (modern power plant; plant for the elimination of sulphur dioxide from flue gases).

Papers to be Presented at the Congress

Section A: Ferrous Metals in Chemical Plant Construction.

*A*1. Forgings for the Handling of Fluids at High Temperatures and Pressures. (Gt. Britain.) By H. H. Burton, W. H. Hatfield and T. M. Service. *A*2. Heat-, Rust-, and Acid-resisting Steels. (Gt. Britain.) By W. H. Hatfield. *A*3 Steels for Autoclaves (Gt. Britain.) By R. J. Sarjant and T. H. Middleham. *A*5. Modern Cast Irons in Chemical Plant Equipment. (Gt. Britain.) By J. G. Pearce. *A*6. Some Aspects of the Behaviour of Carbon and Molybdenum Steels at High Temperatures. (Gt. Britain.) By C. H. M. Jenkins, H. J. Tapsell, G. A. Mellor and A. E. Johnson. *A*7. Corrosion and Protection of Cast-iron and Steel Pipe-lines in the soil. (Holland.) By C. A. H. von Wolzogen Kühr and J. Ph. Pfeiffer. *A*8. Use of Cast Iron in the Chemical Industry. (United States.) By H. L. Maxwell.

Section B: Refractories, Rubber, Plastics and Other Materials in Chemical Plant Construction.

*B*1. New Canadian Refractories and their Application. (Canada.) By F. E. Lathe. *B*2. Refractories for Use in the Carbonising Industries. (Gt. Britain.) By A. T. Green and F. H. Clews. *B*8. Experiments on the Testing of, and the Effect of Reducing Gases on, Grog Bricks for Blast Furnaces. (Japan.)By Yoshiaki Tadokoro.

(*a*) *Non-Metallic Materials:* *B*3. Stoneware in Chemical Plant Construction. (Gt. Britain.) By A. Hickman, G. N. Hodson and W. E. Speirs. *B*4. Plastics in Chemical Plant Construction. (Gt. Britain.) By H. V. Potter. *B*5. Use of Rubber for Chemical Equipment. (Gt. Britain.) By S. A. Brazier. *B*6. Apparatus for the Study of Heat-Insulating Materials for Use at Low and High Temperatures. (Gt. Britain.) By Ezer Griffiths. *B*7. Chemical Engineering Problems in Relation to the Coarser Textile Fibres: Jute, Coir and Sisal. (Gt. Britain.) By S. G. Barker. (*b*) *General and Non-Ferrous Materials:* *B*9. Experience with Non-Corrodible Materials in the Swedish Chemical Industry. (Sweden.) By E. Norlin. *B*10. Correct and Faulty Treatment of Aluminium Plant. (Germany.) By H. Röhrig. *B*11. Metals and Alloys Used in the Construction of Chemical Plant. (United States.) By James A. Lee. *B*12. Applications of X Rays to the Study of the Annealing of Commercial and Refined Aluminium. (France.) By Prof. J. J. Trillat.

Section C: Separation.

I.—SEPARATION *WITHOUT* CHANGE OF PHASE OR PHYSICAL STATE. (*a*) *Filtration.* *C*9. Filter Presses. (Gt. Britain.) By E. A. Alliott. (*b*) *Hydraulic Separation.* *C*1. Concerning the Theory of Coal Washing. (Holland.) By V. Spée.

II.—SEPARATION *WITH* CHANGE OF PHASE OR PHYSICAL STATE. (*a*) *Absorption and Adsorption.* *C*3. The Designing of Gas Works with reference to the Recovery of Benzole. (Germany.) By F. Plenz. *C*7. The Recovery of Benzole from Coal Gas. (Gt. Britain.) By W. G. Adam and G. W. Anderson. *C*10. The Wet Purification of Coke-oven Gas. (Holland.) By H. A. J. Pieters. (*b*) *Crystallisation.* *C*20. Crystallisation. (France.) By J. A. Courbis. (*c*) *Distillation.* *C*12. Graphical Calculation of Plate Columns. (Sweden.) By E. Oman. *C*8. Graphical Computations for the Separation of Ternary Mixtures by Distillation. (Gt. Britain.) By L. C. Strang and A. W. Nash. *C*14. Distillation. (United States.) By G. G. Brown. *C*2. Recent Advances in Rectification Technology. (Germany.) By E. Kirschbaum. *C*4. Modern Methods for the Production of Absolute Alcohol. (Germany.) By R. Fritzweiler and K. R. Dietrich. *C*6. The Production and Treatment of Road Tar in Great Britain. (Gt. Britain.) By W. E. Cone and W. J. Chadder. (*d*) *Drying.* *C*15. The Air-drying of Solids. (United States.) By T. K. Sherwood. *C*19. Drying by Spraying or Atomisation. (France.) By A. Antoni.

(*e*) *Evaporation.* *C*16. Recent Advances in the Design of Evaporators. (U.S.S.R.) By N. Galperin. (*f*) *Extraction.* *C*11. Fractionation of Heavy Oils by Means of Solutions of Gases. (Poland.) By S. Pilat. *C*18. Chemical Engineering Design of Solvent Extraction Units for Refining Lubricating Oil. (Gt. Britain.) By T. G. Hunter and A. W. Nash.

III.—SEPARATION INVOLVING CHEMICAL SEPARATION. *C*5. Problems of the Removal of Carbon Monoxide from Town Gas. (Germany.) By R. Mezger. *C*13. The Modern Cracking Process. (United States.) By Gustav Egloff and Edwin F. Nelson. *C*17. The Production and Utilisation of Hydrogen from Gases containing Methane. (U.S.S.R.) By W. A. Karzhavin.

Section D : Size Reduction, Grading and Mixing ; Electrolysis and Electrical Applications.

*D*3. Estimation of Very Finely Divided Solids. (Germany.) By H. W. Gonell. *D*4. New German Technical Development in the Use of Low-grade Fuels (Pulverising and Firing in One Process). (Germany.' By B. Kramer. *D*5. Control of Fine Grinding and Its Theory. (France.) By J. D. Mary.

*D*1. Power : A Raw Material for Chemical Industry. (Canada.) By A. Skelton. *D*2. Electrolytic Water-treatment for the Prevention of Corrosion and Boiler-scale, especially in Hot-water Systems. (Denmark.) By T. C. Thomsen. *D*6. Electrical Pasteurisation of Liquids. (Holland.) By A. H. W. Aten. *D*7. Anodic Oxidation of Aluminium and its Industrial Application. (Japan.) By Akira Miyata. *D*8. Some Properties of Deposits of Low Carbon Steel in Arc Welding. (Japan.) By Prof. Minoru Okada. *D*9. Recent Developments in the Electrochemical Industry in Japan. (Japan.) By Totagoro Tanahashi, Tsutomu Shoji and Motoo Otani. *D*10. An Electrolytic Method of Removing Small Quantities of Iron from Solutions of Aluminium Salts. (Sweden.) By Prof. W. Palmaer. *D*11. Electrometallurgical and Electrochemical Industries based on Hydraulic Power in Norway in 1934. (Norway.) By E. Svanöe.

Section E : Destructive Distillation.

*E*1. The Practical Application of the Results of Recent Physicochemical Research in the Swiss Gas Industry. (Switzerland.) By Prof. P. Schläpfer. *E*3. The Dry Distillation of Wood and its Thermal Balance Sheet. (Austria.) By K. Kietaibl. *E*5. Problems of Control in the Production of Water Gas from Lignite in a Continuous Generator. (Germany.) By H. Müller. *E*6. Manufacture of Town Gas and Gas for Chemical Syntheses from Lignite. (Germany.) By W. Allner. *E*7. Low-temperature Carbonisation of Coal. (Germany.) By F. Müller. *E*8. Development of Chemical Engineering in the Gas Industry. (Gt. Britain.) By T. Campbell Finlayson. *E*9. Town Gas from Brown Coal, Lignite or other Recent Coals. (Hungary.) By J. Györki. *E*10. Recent Development of the Low-temperature Carbonisation Industry in Japan. (Japan.) By Yoshisada Ban. *E*11. Correlation between Coal Analysis and Semi-scale and Industrial Carbonisation. (Sweden.) By S. Qvarfort. *E*12. Underground Gasification of Coals. (U.S.S.R.) By P. A. Chekin, A. I. Semenoff and J. S. Galinker. *E*13. Plant Experiments with the Bureau of Mines—American Gas Association Carbonisation Retort. (United States.) By A. C. Fieldner and J. D. Davis.

Section F : Treatment and Disposal of Effluents and Waste Materials ; Lubrication.

*F*7. The Treatment and Disposal of Industrial Wastes. (United States.) By W. L. Stevenson. *F*3. The Disposal of Industrial Effluents. (Gt. Britain.) By H. T. Calvert. *F*2. Purification of Waste Water from Yeast Factories. (Denmark.) By K. E. Jensen. *F*4. The Disposal of Gaseous Effluents. (Gt. Britain.) By W. A. Damon and B. Wylam.

*F*1. Recent Processes which have Increased the Flexibility of the Phenol Process for the Treatment of Lubricating Oils. (Canada.) By R. K. Stratford. *F*8. Use of Liquid Propane in Dewaxing, Deasphalting and Refining Heavy Oils. (United States.) By R. E. Wilson, P. C. Keith, jun., and R. E. Haylett. *F*5. Relation between the Properties of Lubricating Oil and its Chemical Structure. (Holland.) By H. I. Waterman and J. J. Leendertse.

Section G : High Pressure Reactions and High Vacua.

*G*1. Physics of High Vacuum Technology. (Germany.) By Prof. W. Gaede. *G*3. Applications of High Pressure in the Synthesis of Organic Compounds. (Gt. Britain.) By Prof. G. T. Morgan. *G*4. Development of an Intermediate-scale Plant for High-pressure Hydrogenation of Tar and Tar Distillates. (Gt. Britain.) By J. G. King and J. Fraser Shaw. *G*5. High-pressure Chemical Industries in Japan. (Japan.) By Yoshikiyo Oshima. *G*6. Synthesis of Methanol from Coal. (Japan.) By Takashi Eguchi. *G*7. Construction of Welded Pressure Vessels for the Petroleum Industry. (United States.) By R. K. Hopkins. *G*8. Gaseous and Liquid Phase Reactions at High Pressures. (Gt. Britain.) By Prof. W. A. Bone and D. M. Newitt.

Section H : Heat Exchange.

*H*1. The Concentration by Evaporation of Solutions Liable to be Affected by High Temperatures. (Austria.) By W. Vogelbusch. *H*2. Questions of Heat Transference in the Chemical Industry. (Germany.) By S. Erk. *H*3. Heat Transmission—Some Recent Advances. (Gt. Britain.) By C. H. Lander, M. Fishenden and O. A. Saunders. *H*4. Heat Transfer Coefficients for Water and Steam in a Surface Condenser. (Gt. Britain.) By R. M. Ferguson and J. C. Oakden. *H*5. A New Method of Evaporation Operating at Low Temperature with Waste Heat. (Sweden.) By H. Elis E. Göth. *H*6. A New Method of Waste-heat Recovery from Intermittent Sources, such as Gases and Vapours in the Chemical Industry. (Sweden.) By C. Rosenblad. *H*7. Heat Transmission. (United States.) By T. B. Drew, H. C. Hottel and W. H. McAdams. *H*8. Induction Heating in the Chemical Industry. (United States.) By C. E. Daniels. *H*9. Condensation of Vapours Admixed with Gases. (France.) By M. Rouilly.

Section J : Education and Training.

*J*1. Education and Training of the Chemical Engineer in Austria. (Austria.) By Prof. W. J. Müller. *J*2. Problems of the Education and Training of the Chemical Engineer in Germany. (Germany.) By A. Eucken. *J*3 (*a*) Education and Training of the Chemical Engineer. (Gt. Britain.) By H. W. Cremer and A. J. V. Underwood. *J*3 (*b*). Technical Education in the Gas Industry. (Gt. Britain.) By C. H. Creasey. *J*3 (*c*). Education and Training for the Oil Industry. (Gt. Britain.) By Prof. A. W. Nash. *J*4. Education and Training of Chemical Engineers in Japan. (Japan.) By Saburo Uno. *J*5. Chemical Engineering Education in the United States. (United States.) By Prof. A. H. White.

Section K : Statistics ; Administration ; Safety and Welfare.

*K*1. Occupational Risks in the Chemical Industry and their Prevention. (Germany.) H. Martius. *K*2. Statistical Method as an Aid to Control of Industrial Efficiency. (Gt. Britain.) E. S. Pearson. *K*3. Planning and Control of Chemical Manufacture. (Gt. Britain.) T. Donaldson. *K*4. Some Aspects of Accident Prevention in Industry. (Gt. Britain.) C. S. Robinson and H. R. Payne. *K*5. Cost Analysis for Process Expense Control. (United States.) Prof. W. P. Fiske. *K*6. Influence of Location upon the Cost of Production. (United States.) J. L. Warner. *K*7. Considerations Influencing the Formulation of Chemical Engineering Projects. (United States.) Crosby Field.

Section L : Trend of Development.

GROUP I.—WATER TREATMENT, INCLUDING HEAT FLOW IN STEAM PLANTS. *L*2. Water-softening in a Modern Lager Beer Brewery. (Denmark.) By Prof. C. Jacobsen. *L*4. Water Treatment. (Gt. Britain.) By L. O. Newton. *L*5. Some Principles of Water-conditioning. (Gt. Britain.) By P. Hamer. *L*8. Recent Methods of Feed-water Treatment and their Place in the Heat Flow of Steam Plants. (Austria.) By H. Riemer. *L*13. On Heat Economy and on the Treatment of Feed-water and Boiler-water in the German Chemical Industry. (Germany.) By A Splittgerber.

GROUP II.—THE HEAVY CHEMICAL INDUSTRY. (*a*) *Sulphuric Acid :* *L*9. The Sulphuric Acid Industry in Japan. (Japan.) By Mototaro Matsui. *L*10. The Use of Nitrous Gases for the Intensive Manufacture of Sulphuric Acid. (U.S.S.R.) By Prof. V. N. Shulz. (*b*) *Phosphatic Fertilisers :* *L*11. Methods for the Production of Concentrated Fertilisers from Poor Phosphates. (U.S.S.R.) By E. Britzke and Prof. S. Volfkovich. (*c*) *Calcium Carbide :* *L*7. Granular Carbide and its Characteristics. (Japan.) By Katsuharu Hibi.

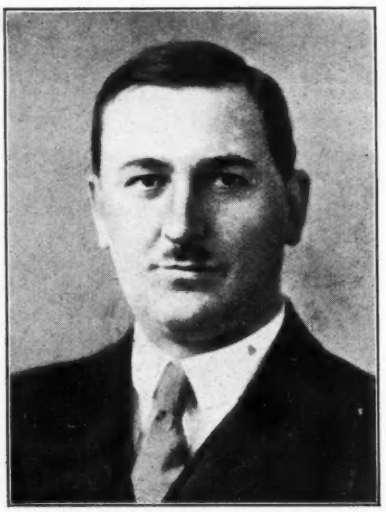
GROUP III.—BIOLOGICAL PROCESSES. (*a*) *Fermentation :* *L*1. Some Observations on theDesign of Apparatus and Heat Economy in the Fermentation Industry. (Austria.) By W. Vogelbusch. (See also *L*2 in § 1 above). (*b*) *Refrigeration :* *L*6. The Progress of the Frozen Food Industry in Japan. (Japan.) By Takeshi Murayama. (*c*) *Fumigation :* *L*3. Recent Advances in Fumigation and the Needs of Fumigation Practice. (Gt. Britain). By Prof. J. W. Munro.

Section M : General Aspects.

*M*1. Formation of Monomolecular Films on Thin Foils of Metals annd Cellulose. (Austria.) By H. Mark and H. Motz. *M*2. Raw Materials for Chemical Manufacture and the Manufacture of Chemical Products in Canada. (Canada.) By A. W. G. Wilson. *M*3. Advances in Canada in the Realm of Chemical Engineering. (Canada.) By Prof. G. Stafford Whitby and F. Gordon Green. *M*4. Present State of the Standardisation of Chemical Apparatus and its Further Development. (Germany.) By Prof H. H. Franck. *M*5. Relation between Low-temperature Research and Colloid Chemistry. (Germany.) By F. F. Nord. *M*6. Practical Importance of Spectroscopic Micro-analysis. (Germany.) By Prof. W. Gerlach. *M*7. Optics in the Service of the Chemical Engineer. (Germany.) By F. Löwe. *M*8. Organisation of an Industrial Research Station. (Gt. Britain.) By A. E. Dunstan. *M*10. Place of Fundamental Research in an Industrial Research Organisation. (United States.) By C. M. A. Stine. *M*12. Research Institutes and Designing Establishments for Chemical Engineering in the U.S.S.R. (U.S.S.R.) By Prof. N. F. Juschkewitsch. *M*13. Public and Private Research Institutions Connected with Chemical Industry in Japan. (Japan.) By N. S. Kyoku.

British Chemical Plant Exhibition

Central Hall, Westminster, June 22 to 27



Mr. J. Davidson Pratt, Secretary of the British Chemical Plant Manufacturers' Association and Chairman of the Finance Committee of the Chemical Engineering Congress.

THAT the interdependence of science and industry is better understood nowadays could hardly be better illustrated than by the fact that the Chemical Engineering Congress is being held concurrently with the British Chemical Plant Exhibition at the Central Hall, Westminster, June 22 to 27. Distinguished visitors are coming to the Congress to explain the place of fundamental research in an industrial research organisation in the United States, and the relation between low-temperature research and colloid chemistry in Germany; Russians and Japanese will tell the Congress about the way research in chemical engineering is organised in their respective countries, and at the Chemical Plant Exhibition, the Department of Scientific and Industrial Research is showing the manifold ways in which it assists British industry in the application of the results of scientific research.

Materials of Construction

The use of corrosion-resisting steels, the consruction of autoclaves, important questions relating to drying, heat transfer, the disposal of effluents both solid and gaseous, the recovery of waste heat, the handling of liquids, and water conditioning, are amongst the subjects which are to be discussed by the Congress, and their counterparts in practice can be studied in the Chemical Plant Exhibition. Here we can study not only the new corrosion-resisting steels exhibited by their makers, but their applications in the form of dye baths and beakers, as well as similar material in steel protected by vitreous enamels and in earthenware. One firm, which is stated to possess the finest plant in existence for the manufacture of glass-lined equipment, is showing plant for making dyes; another firm which also boasts of a well-equipped engineering plant, are suppliers of a complete plant for the manufacture of artificial silk. At one stand pumps are being shown of a make which is handling large quantities of wool-washing liquid. Elsewhere there are filter presses of a type favoured by the dry-cleaning industry.

Some of the exhibitors specialise in centrifugal machines and examples of these are also to be seen. Other exhibits include stainless steel cocks and fittings, and valves that never stick, together with oxy-acetylene apparatus which is employed for maintenance work. Instruments which record and control hydrogen-ion concentration or which are employed to measure, register and automatically control temperature, humidity and pressure, form another feature of the exhibits. Even the needs of the laboratory have not been overlooked, for there is a special display of Gooch crucibles, laboratory centrifuges, sifters, emulsifiers and thermometers.

Advances in Process Equipment

Special sections of the Congress are disccussing the problems of the materials used in the construction of process plant and the practical results obtained in their industrial application, whilst there are numerous papers on subjects such as rectification technology, distillation, evaporation, drying, crystallisation, electrical pasteurisation, problems of yeast manufacture, the disposal of effluents and industrial wastes, the concentration of delicate solutions, refrigeration, costing, water-softening in a brewery, and many other questions of fundamental importance to the industry.

Serving as a complement to these discussions, the Chemical Plant Exhibition illustrates the most recent advances that have been made in process equipment. Plant manufacturers exhibit the utilisation of stainless steels in the fabrication of equipment which obviates any danger of contamination when used to handle the most delicate food products. Of note among corrosion-resistant plant, which includes aluminium and other vessels for the storage of liquid food products in bulk, should be noted exhibits of glass-lined equipment which is the works counterpart of laboratory glassware; vitreous enamelled ware of various kinds, and the new white stoneware which combines the qualities of ordinary brown stoneware and porcelain. Emulsifiers, screening and sifting machines, and driers, are exhibited in forms that satisfy every requirement of the food industry. There are also machines for making tablets, granulating machines, sterilisers for bottles and flasks, continuous band dryers of the vacuum type for the most delicate food products, the latest types of stainless steel gauze, and centrifugal machines for handling sugar and other products.

Modern Tendencies

In many other ways the Chemical Plant Exhibition provides a singularly valuable commentary on the Chemical Engineering Congress, as its exhibitors are showing a very wide range of appliances and equipment to meet the demands of modern industry. In addition to the apparatus required for processes such as evaporation, distillation, drying, feeding, screening, sifting, etc., there is plant for filtering, pumping, separating, clarifying and so on. Of special interest is one particular exhibit designed for the continuous high-temperature heat-treatment and polymerisation of vegetable oils, and a small plant (made in welded nickel) for the manufacture of synthetic resins. An illustration of modern tendencies in moulding practice in the plastics industry is to be found on one stand, where a machine is shown which is used to preform the tablets which are beting increasingly used to replace the powders employed in bakelite moulding.

Amongst other exhibits are valves, such as the streamline diaphragm valve and the lubricated plug valve which never sticks; material for making joints which resist the most exacting conditions of heat, humidity and chemical attack; various types of gas-fired equipment (including a drying oven used for the ageing of rubber, and an aluminium varnish pot), and high-duty iron castings for corrosive services.

The important exhibit organised by the Department of Scientific and Industrial Research which is dealt with elsewhere in this issue of THE CHEMICAL AGE illustrates some of the directions in which research carried out under the auspices of the Department is assisting the British chemical engineer-

ing industry. Amongst the investigations illustrated are work on the heterogeneity of steel ingots, on corrosion and on castings, linked up with the hydrogenation of coal. Then come refractories, heat insulators, heat transmission, flow of heat through metal tubes, properties of steel at high temperatures, coal and its by-products, pulverised fuel, coal carbonisation, the hydrogenation of tar, flour conditioning, chemical engineering applications of rubber, corrosion-resisting alloys, the base-exchange treatment of water (utilising synthetic resins), purification of waste dairy waters, high-pressure research, continuous extraction by organic solvents and the effect of paint on illumination.

Plant Manufacturers at the Exhibition

A Look Round the Stands

The Aluminium Plant and Vessel Co., Ltd.

Stand Nos. A.7 and A.9

The exhibits at these stands are by no means confined to aluminium plant. The aluminium features include an aluminium dephlegmating condenser, 4 ft. diameter and 10 ft. long, another large condenser lying on its side, 100 gal. aluminium drums for the transport of acetic acid, and other plant. Much interesting work in other metals, such as nickel, Monel metal, stainless alloys, gun metal, copper, and Alpax metal (an "A.P.V." aluminium-silicon alloy), is also shown, and as befits one of the oldest firms in the industry, it is particularly proud of its welding, whether of copper, aluminium or stainless steel.

An interesting synthetic resin still, constructed in nickel, and fitted with reflux and vapour condensers, is suitable for experimental work under a vacuum and has been specially constructed for a research department. The 60 gal. standard varnish kettle with an aluminium body and a detachable copper bottom reminds one that the firm has the sole rights for the Sommer plants and processes in Great Britain and the British Empire. Complete ester gum and enamel plants are thus provided, including pressure gas and fuel oil heating installations, as well as complete fume removal and condensation systems. With the Sommer process the products are always uniform, there is the utmost possible safety against fire, and as the process is carried out in the absence of atmospheric oxygen the product obtained is a truly polymerised oil. The use of the "A.P.V." regenerative heater ensures great economies of time and fuel. The 2-ton standard "A.P.V." Sommer type stand oil pant is shown erected as it is normally supplied to the trade, with the arrangement of flues indicated by a plan painted on the floor. A small vacuum plant, also on view, has the main kettle constructed in Alpax.

Of special interest is the new type of plate heat exchanger provided with stainless steel plates. Originally designed to meet the needs of the liquid-food industries, this heat exchanger is finding a much increased range of applications. The liquids move in counter flow, and as the direction of flow is reversed at the end of each plate, the turbulence thus set up considerably enhances the exchange of heat. The machine is of particularly elegant presentation, very compact, absolutely hygienic and very easy to maintain and operate.

Other "A.P.V." exhibits include a 130 gal. varnish pot in stainless steel with a detachable bottom; a copper tube, 2 ft. 4 in. diameter, 1 ft. 8 in. deep, $\frac{3}{8}$ in. thick, pressed from a copper circle; various varnish pot bottoms in Monel metal; and various small fittings, such as leak-proof cocks, stainless alloy pipe fittings, Alpax and gun metal castings. Castings are largely employed in "A.P.V." plant, and castings of all types are supplied to order.

Ashmore, Benson, Pease and Co., Ltd.

Stand No. B.5

Acid-resisting steel is shown on this stand in the form of an autoclave constructed of an inner shell of "Weldanka" steel with plates and angles welded together, the outer shell being mild steel. Vessels such as this are generally used for "boiling up" various fluids—dyes, essences, confectionery, chemicals—by means of steam. "KKK" homogeneous lead lining is illustrated by a homogeneously lead-lined autoclave, 15 in. diameter by 20 in. deep, and a homogeneously lead-lined heat interchanger 21 in. by 16 in. deep. "Meehanite," of which various castings attract notice, is a close-grained pearlitic sorbitic iron which has properties far superior to those of cast iron, with similar casting and machining properties; it is denser than cast iron and takes a fine finish.

A selection of photographs and copies of publications refers to other products of this firm as well as to those of its associate, the Power Gas Corporation. Amongst the latter there is an interesting plant for gasification with a blast enriched with oxygen to the extent of 40 per cent. (on a dry basis). The gas produced is used for the synthesis of ammonia, and further development is possible in that a gas of greater calorific value can be produced continuously in which there is but little infiltration of nitrogen such as is usual in the intermittent process of water gas manufacture. This feature is also important to industries requiring cheap hydrogen containing less nitrogen than is customary.

Audley Engineering Co., Ltd.

Stand No. B.2

The latest type of "Audco" lubricated valve is on view at this stand. In this valve, which incorporates the new "Lubriseald" system of four-groove lubrication, an ingenious disposition of the ducts eliminates the possibility of lubricant being fed into the pipeline and, controversely, prevents the fluid from leaking out of the pipeline, the ports being sealed when the valve is either open or shut. The system is such that the valve plug can be eased on its seat in any working position of the valve, and whenever the plug is eased, lubricant is automatically distributed between the plug and the working surface of the body. Suitable lubricants, of course, are required, and a range of plastic lubricants is shown for use with practically any fluids and gases met with in the chemical and allied industries.

The Audley Engineering Co. has found that the disc valve lends itself very well to multi-port designs, of which some interesting examples are also shown, and which are finding many new applications at pressures up to 3,000 lb. per sq. in. These disc valves are more easy to turn than plug valves. A recent development is an "Audco" lubricated valve for milk and milk products, its special feature being that the valve can be dismantled instantaneously for sterilisation. These valves are also much used for petrol and oils, which is a testimony to their leak-proof nature, combined with ease of turning. An "Audco" lubricated plug valve of 14 in. bore disproves the general idea among engineers that plug cocks cannot be made in sizes over 6 in. bore without becoming extremely difficult to turn. The "Sulphitometer," incorporating an "Audco" lubricated disc valve, is used for the rapid measurement and discharge of predetermined quantities of liquid sulphur dioxide in bleaching processes.

Henry Balfour and Co., Ltd.

Stand No. B.23 and B.28

The generator exhibited at these stands combines a distillation retort and a water gas generator in one unit, the coal being completely gasified. Coal fed from a storage hopper into a distillation shaft is subjected to low-temperature distilla-

tion under carefully controlled conditions which ensure a minimum loss of volatile matter. This shaft is so shaped that the coal settles down of its own accord and by the time it reaches the bottom it is converted into an extremely reactive semi-coke.

Owing to the high reactivity of the semi-coke, blue water gas of high quality is generated, as is shown by the results obtained with the plant. The reason why such highly reactive semi-coke is produced lies in the even heating of the coal in the distillation shaft, an attainment which testifies to the efficiency of the design of the plant. Efficiency can be further increased by passing the distillation gases through a carburetter in which the tar vapours are cracked. The process generally works on a 2 minute blow and an 8 minute run, giving 6 cycles per hour, depending on the coal used. Without tar cracking, 50,000 cu. ft. of gas of 330-350 B.Th.U. per cu. ft. is produced per ton of coal, and with tar cracking, 54,000 cu. ft. of gas of 360-380 B.Th.U. per cu. ft. per ton, thus giving respectively gasification efficiencies of 60 and 66 per cent. and thermal efficiencies of 77.1 and 71.7 per cent. These coal water gas plants can be used to produce gas for chemical works.

A new jacketed heating or cooling vessel, with the special " dimple stayed " construction also demands attention at these stands, as it enables moderately high pressures and consequently higher temperatures to be used in the jacket without requiring corresponding increases in plate thicknesses. This steel vessel has a British-made " Pfaudler " glass-lined inner vessel. The special " Samka " tube wall jacket construction, of which samples are shown, is designed to suit heating and cooling vessels working at exceptionally high pressures and temperatures. As the wall thickness of these vessels is much thinner than is usual, there is a saving in cost. The 20-gal. jacketed tilting pan is made in nickel, and is designed for a working pressure of 100 lb. per sq. in. Of note are the fine hygienic finish of the interior, and the fact that steam and condensate outlets being arranged inside the jacket (connection being made through the trunnions) the outside of the pan is also easily cleaned.

Bennett Sons and Shears, Ltd.

Stand No. A.12

The combined vacuum still and extraction apparatus exhibited at this stand is a neat piece of work which is supplied in any size to suit requirements. It can be used, simply by regulating two cocks, either as a solvent extraction apparatus or as a vacuum still as required. There is also a representative vacuum still complete with receivers and vacuum pump, which can be obtained lined with tin, nickel or silver to suit various duties. The " Ideal " condenser furnished with this still is shown separately; it is an annular concentric condenser, in which vapour is rapidly condensed and the subsequent distillate cooled between narrow annular spaces of special design, the cooling being effected from both sides of the annular space and not from one side only, as in the ordinary tubular or worm condenser. Space and weight are reduced, cleaning is easy, and the efficiency is remarkably high.

This firm has long specialised in solvent extraction apparatus, of which examples are shown for the works and also the laboratory. They make small vacuum stills for the rectification of essential oils and fatty acids, lime juice and a variety of other products. Emulsification is also provided for, as they supply hand mixers and emulsifiers treating various materials in capacities from 5 qts. up to 500 gal.

British Chemical Plant Manufacturers' Association

Stand No. A.8

The British Chemical Plant Manufacturers' Association was formed in 1920 with the object of encouraging the manufacture and utilisation of chemical plant. The Association is not a trading concern, and makes no profit on any business transacted by its members. Its present membership covers 47 firms, representing every important aspect of the chemical plant manufacturing industry, from the manufacture of special steels and anti-corrosive constructional media, to the fabrication of plant of standard or semi-standard design right on to the complicated and special designs which form the basis of modern chemical manufacturing methods. In addition to the usual activities of a trade association, it arranges for informal discussions on problems of general interest to its members with users of chemical plant.

The Association also acts as a clearing house and information bureau on inquiries for chemical plant. In this way, it has been able to assist many hundreds of chemical and allied manufacturers who have met difficulties in finding reputable firms who can deal with the highly specialised requirements which are the characteristics of modern chemical works equipment. A directory of chemical plant manufactured by members of the association can be obtained at this stand.

British Gas Federation

Stand No. B.4 and B.6

Modern gas equipment for the laboratory is abundantly illustrated at these stands by the latest type of Bunsen burners, the Bornkessel glass-blowing burners, sink type water heaters, water stills and so on. Other laboratory equipment includes a well-finished drying oven using recirculated air in a rapid air circuit, with an electric motor and fan; constant temperature baths, with the Hearson thermostat as used for the reductase milk test; and two small " G.L.C." muffle furnaces, which like the " G.L.C." combustion tube furnace are well-finished pieces of apparatus that give temperatures up to 1,250° C. Included with the full-scale equipment on view is an automatic generating set in actual operation, as well as air heaters both of direct and indirect type.

The main object of this stand, however, is to illustrate the work of the new Industrial Gas Development Centres which have recently been set up all over the country to help gas undertakings to advise consumers on the choice and maintenance of gas-burning equipment. For this reason, in addition to the equipment mentioned above, the various applications of gas are illustrated by means of photographs of actual installations and by means of technical literature of a particularly useful type.

British Oxygen Co., Ltd.

Stand No. B.20

At this stand there is an interesting exhibit of various types of welding equipment, together with its uses for the welding of copper, Monel metal, stainless steel, lead, aluminium and other of the ferrous and non-ferrous metals which are so largely used in the construction of chemical plant. In addition to chemical plant, the brewery, food and other industries are beholden to oxy-acetylene welding for the manufacture of much of their equipment, and some typical examples of applications of welding are to be seen. Thus, copper up to half an inch in thickness is oxy-acetylene welded in the manufacture of tanks and parts of beer carbonating plant. Aluminium up to $\frac{3}{8}$ in. thick is used to make pans and vessels which find numerous applications in the chemical industry. Where corrosive action must be safeguarded against, stainless steel of different kinds and in gauges from the thinnest upwards is welded in the form of drums, vats, tanks and many other parts of plant which are required in the numerous industries based on chemical engineering.

Apart from its use in the actual manufacture of chemical plant, oxy-acetylene welding plays a very important part in maintenance in chemical works, chiefly in the welding of piping and in the making and repair of small fittings. A special feature of this exhibit is a small display and demonstration of the utilisation of oxy-acetylene lead burning in chemical works.

Thomas Broadbent and Sons, Ltd.

Stand No. A.15

The principal feature of this stand is a 48 in. direct, electrically-driven, suspended type centrifugal, with an imperforate basket and swimming gear. This type of centrifugal is used for precipitating fine solids held in suspension by a liquor. In operation, the liquor or slurry is fed into the basket while the machine is running at a speed of 950 r.p.m., and when the liquid has almost reached the rim of the basket the inflowing liquid is cut off. Owing to the action of centrifugal force, the suspended solids are quickly forced against the wall of the basket, whereas the clarified liquor is skimmed off (through an adjustable pipe with a knife-edge nozzle), in a continuous stream which has sufficient velocity to force the liquid through a pipe-line to a receiving or storage tank. The centrifugal, when empty, is recharged with liquor and the process is repeated until a solid cake is formed around the periphery of the drum. The machine is then stopped and the cake removed, usually by means of wooden shovels. The capacity of the machine depends on the material, and may vary from 80 to 250 gal. per hour.

Another machine exhibited is the 26 in. self-contained fixed spindle, belt-driven centrifugal with a perforated vulcanised steel basket with gauze linings and with vulcanised and acid-resisting fittings throughout, such as a lead-lined monitor case, lead-covered top and so on. This machine is stopped or started by the movement of a lever—there is no moving of the belt from fast and loose pulleys. It is suitable for handling a great variety of chemicals in small quantities. Examination of the centrifugal baskets shows that these can be fabricated from different metals to meet requirements, whether in steel, vulcanised steel, stainless steel, Monel, copper or aluminium.

Brown Bayley's Steel Works, Ltd.

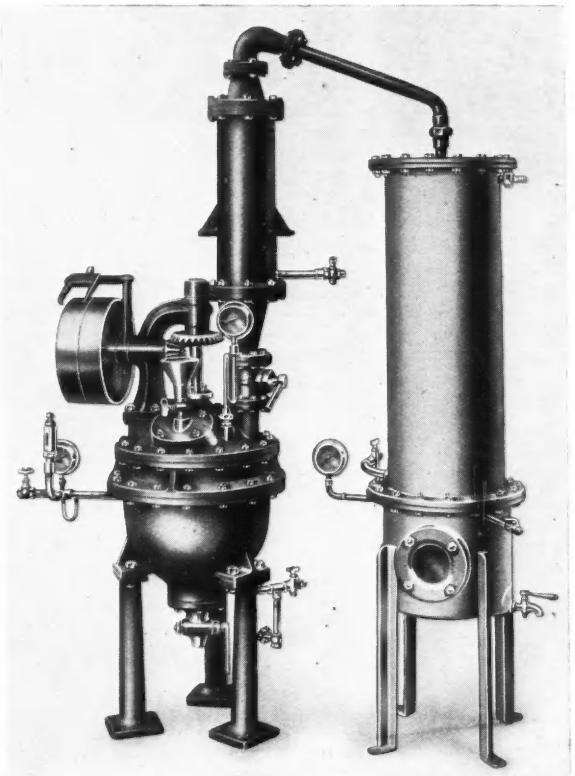
Stand No. B.30

At this stand special stress is laid on three brands of corrosion-resisting steels, namely "Anka," "Weldanka," and "Brearley K." "Anka" is an austenitic steel which generally contains about 18 per cent. of chromium and 8 per cent. of nickel. It is widely used in the construction of chemical plant, but like other similar steels it requires heat treatment after welding. This necessity arises from a tendency to intergranular corrosion, a tendency found in all steels of this type after they have been heated, even for short periods, to a dull red heat. This difficulty, however, has been overcome by producing a special form of "Anka" known as "Weldanka," which is quite free from intergranular corrosion. "Brearley K" is a high-chromium stainless iron, sensibly free from nickel, which has been used particularly in the nitric acid industry. It is intended for riveted constructions, though it can be welded.

Cannon Iron Foundries, Ltd.

Stand No. A.10

The steam-jacketed still with motor-driven agitator shown at this stand is of 25 gal. capacity, and represents a range of stills made for various duties and in sizes from 25 to 500 gal. The complete synthetic resin plant, comprising a mixing pan having a capacity of 5 gal., is intended for small-scale work. Steam-jacketed autoclaves with agitators are also made in various sizes for the manufacture of synthetic resins. Fittings such as pressure and vacuum gauges, relief valves, etc., are included with this type of autoclave, which also has a special loose stuffing box, improved enclosed gearing, fast and loose pulleys, belt shifter, etc. Cast-iron steam jacketed pans of various types are available, both in shallow and deep patterns. An agitator of special type is supplied to suit the fixed baffles in these pans, which are of the British Standard type, designed to give a maximum of efficiency in respect of heating surface, working capacity and strength, and are supplied in sizes ranging from 10 to 200 gal. The attention paid to mechanical details characteristic of this firm is well illustrated by the steam-jacketed mixing digester on view, flanked by a small machine suitable for laboratory work.



This small scale synthetic resin plant is used in the preparation of synthetic resins of phenol-formaldehyde type. The steam-jacketed autoclave, capacity 5 gallons, is complete with agitator and driving gear. The cover is fitted with charging hole, pressure gauge and vapour outlet connected to a reflux condenser. The reflux condenser comprises a nest of tubes, with water jacket and control cock for cooling water. The reflux condenser is in operation whilst the material is being digested in the autoclave. After reaching a certain stage in the process, a vacuum is applied and the hot moist vapours are drawn over into a secondary condenser, which is connected with a receiver for the condensate. The makers of the plant are Cannon Iron Foundries, Ltd.

THE CHEMICAL AGE stand at the British Chemical Plant Exhibition is No. B29 (basement), where a wide range of current technical literature will be displayed for the benefit of visitors.

T. and C. Clark and Co., Ltd.

Stand No. A.3

This firm specialises in chemical plant protected with acid-resisting enamel, which is guaranteed to be free from lead, antimony and other injurious ingredients. Enamelled cast iron vessels are made in all sizes from ½ pint capacity for small-scale work, up to 1,500 gal. for large-scale production, and are used both in this country and abroad where contamination of the products must be avoided. The exhibits include a cast iron steam-jacketed mixer, protected with acid-resisting enamel, fitted with an anchor-type agitator and a waltzing stirrer, so that it is suitable for mixing heavy, viscous products. There is also a steam-jacketed cast iron still, complete with a water-jacketed fractionating column; a sulphonating pot; examples of enamelled cast iron buckets for carrying mercury amalgam; and enamelled cast iron beakers for the dye house.

The latest development by this firm is the manufacture of glass-lined equipment. The range of fabricated mild-steel vessels of from 20 to 3,600 gal. capacity, lined with hard acid-resisting glass enamel is illustrated by an open glass-lined steel storage vessel, some examples of glass-lined open tanks, a glass-lined steel trough, and a glass-lined section of a mild-steel rotating drum.

Dorr-Oliver Co., Ltd.

Stand No. B.21 and B.24

As specialists in the handling or treatment of mixtures of finely divided solids and liquids, this firm has developed special machines for agitation, classification, thickening and dewatering, washing, filtering, pumping, etc. Generally speaking, these machines convert intermittent processes to continuous operations, the materials being handled mechanically but economically and the human element eliminated as far as possible. The wide range thus covered may be described as the handling of sludges and pulps and from a beginning with the cyanidation of gold ore, Dorr machines

Effluent treatment plant calls for considerable chemical engineering skill and ingenuity. This plant was designed to solve an urgent river pollution problem. The main effluent to be treated was made up of various subsidiary effluents varying somewhat in quality and quantity. It was necessary to devise means of reducing a very high bio-chemical oxygen demand, to catch all suspended matter both organic and inorganic and to prevent any free bleach reaching the river. With the large and irregular flows involved it was essential to find some method which did not call for accurate dosage or use of expensive reagents. It was found that by proper mixing the various effluents could be made mutually purifying, that one effluent if properly used was a powerful flocculant for five particles of cellulose and that this effect if combined with the oxydising effect of chlorine could be utilised to reduce the B.O.D. and at the same time destroy free chlorine. The plant consists of three Dorr agitators, employing combined air and mechanical mixing, two large Dorr S-type clarifiers followed by an Oliver vacuum drum filter. The latter machine discharges a clean firm cake suitable for disposal by cartage. The whole plant operates continuously and practically without attention, except for occasional lubrication, etc. The process used has been patented jointly by J. Dickinson and Co., Ltd., Watford, and Dorr-Oliver Co., Ltd., London.

have come to be applied to general wet-way ore-dressing operations and in chemical and other industrial applications throughout the world.

Most of these machines are represented by models, from which it will be seen that the latest Dorr thickener is a mechanically-operated sedimentation unit enabling a thick underflow sludge and a clear overflow liquor to be continuously produced from a feed consisting of a mixture of finely divided solids and a liquid. The use of Dorr tray thickeners is indicated where there is a demand for large settling area in limited floor space, saving in space to be heated, and lower costs of tanks, piping, superstructures and foundations. There are various types of tray thickeners, suited to handling hot solutions, and they are widely used in chemical process work. In many operations, where final dewatering is to be carried out by filtration, the use of a Dorr thickener will increase the capacity of the filter and help the filter to produce a thicker and drier cake. The Dorrco flocculator is designed to assist coaculation and hasten sedimentation of slow-settling material.

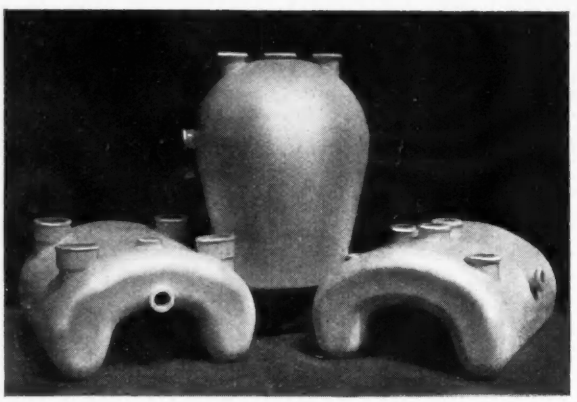
Models also illustrate three of the Dorr classifiers, namely, the bowl, turret-bowl and " F " types. Essentially, a Dorr classifier consists of a settling box in the form of an inclined trough, in which reciprocating rakes carry the quick-settling material up the incline to discharge at the open end, the product being discharged with 20-30 per cent. of moisture. The bowl type consists of a regular classifier on which is superimposed a circular shallow bowl with revolving rake mechanism, the feed entering at the centre of the bowl. The washing and separation given by the bowl type are particularly complete. Used for fine mesh separations, the turret-bowl classifier embodies a new type of support for the rotating mechanism which requires a minimum of head room. For special heavy duty, the " F " type classifier, with its flexibility and its ability to operate at high speeds, comes into play.

The Oliver drum vacuum filter and the Sweetland pressure filter are also shown as models. There are numerous types of Oliver vacuum filters, *e.g.*, the continuous drum, the continuous disc, the Oliver-Borden tube thickener, and the " Dorrco " filter, and there are various modifications of these main types, though the differences are in design, not in principle. In the Sweetland filter the solids are automatically discharged without hand labour and the washing of the cake is most thorough and efficient.

Doulton and Co., Ltd.

Stand No. B.12

Special attention should be paid to the Doulton exhibits in white stoneware. One usually thinks of stoneware as a dark-coloured opaque material and of porcelain as translucent, thin and white. The name " white stoneware " thus might appear to be a misnomer, but, in fact, this new product combines most of the advantages of the two materials. Porcelain is well-known and appreciated in the laboratory, but its use



Three representative pieces of white stoneware hydrochloric acid receivers made by Doulton and Co., Ltd.

to make larger vessels for the chemical industry has proved too expensive for general purposes. White stoneware, however, can be made in sizes almost as large as the old brown stoneware, whilst it has a porcelain-like finish, is completely free from iron oxides, and can be easily cleaned (a quality which is related to its hygienic appearance). Such a product recommends itself at once for applications such as the production of water-white hydrochloric acid, of fine chemicals, cosmetics and, of course, of food products. The smooth surface, further, influences crystallisation, a matter of importance for certain pharmaceutical products.

Exhibits in white stoneware include emulsion jars, hydrochloric acid receivers, a copper, bib taps, tanks, and conical flanged pipes and bends. The pipes are in 5 ft. lengths and in diameters from 1½ to 6 in. The new porous acid-

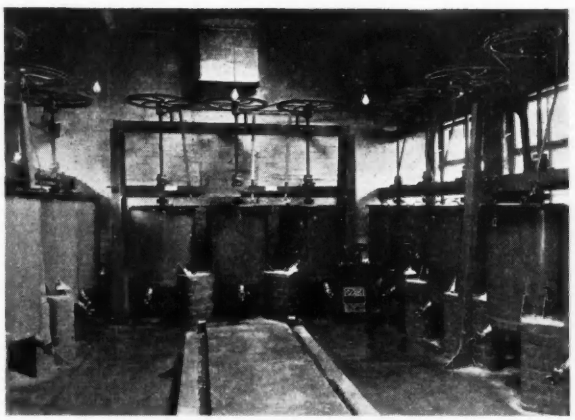
resisting tiles on view are designed to be used to build up tanks of too large a size for one-piece construction. It is possible to make these filters give rates of delivery varying over a wide range.

In examining the exhibit of salt-glaze stoneware, it is pointed out that chemical stoneware resists all acids except hydrofluoric acid and that it requires no exceptions or qualifications such as are usual for metals and other materials which show varying resistance to acids or solutions according to the concentration and the temperature. Amongst the exhibits is a 440 gal. transport jar, a 200 gal. tank and the bottom section of a 48 in. tower, in addition to a rotating drum, block taps, dipping baskets and coils.

Enamelled Metal Products Corporation (1933) Ltd.

Stand No. B.23 and 28

" Pfaudler " glass-lined equipment is here represented by a complete distillation outfit, so designed that the units—stills, condensers, receivers, etc.—can be connected together into a complete glass-lined system. This glass-lined equipment is suitable for handling all mineral and organic acids, etc., but



This illustration shows some of these Pfaudler glass lined torage tanks used by W.T. Copeland and Sons, Ltd., of Stoke-on-Trent, for storing glaze. Their famous " Spode " china is finished with very fine glazes, and an essential condition governing the storage of these glazes is that no particle of rust or dirt shall be present to spoil them. By installing Pfaudler glass lined equipment, the manufacturers of this china assured themselves that this important condition would be fulfilled. They also have the assurance that no metallic contamination of their glazes is possible during storage, but as they use only neutral solutions, reactions with the container are, of course, unlikely. Pfaudler equipment, however, is available for use under almost every kind of corrosive condition, the various glass linings being resistant to all liquids except hydrofluoric acid and caustic alkalies. It is made by Enamelled Metal Products Corporation (1933), Ltd.

not hydrofluoric acid or caustic alkalies. As it resists hydrochloric acid at all concentrations and at a variety of temperatures, it has been a boon to, amongst others, the manufacturer of chlorinated organic compounds, which constitute the extreme test of resistance to chemical corrosion. Further, this equipment is used where metallic contact is undesirable, not only because of its resistance to corrosion, but also because it eliminates discolouration and undesirable catalytic side reactions. Such equipment is indispensable for the manufacture of pharmaceutical products, glandular extracts, hormones and the like.

Another exhibit of interest is a complete cosmetic manufacturing unit, comprising a " Pfaudler " glass-lined, double-motion gate-type mixer, and glass-lined melting and heating tanks. As the mixer gives thorough mixing, with minimum incorporation of air and an absence of vortex, the creams produced are particularly smooth and of excellent colour. The mixer is of the tilting type, but a stationary type is also available. The agitator drive is sturdily built and quiet in operation, taking up its load without over-heating or binding.

The 5 ft. (outside diameter) steam-jacketed drying table on view is used in the manufacture of effervescent salts and crystals which are liable to be discoloured by metals. These tables have been found highly effective for carrying such products to dryness. Various sizes are made, a common size being 72 in. in diameter, with a maximum depth of 7 in., and there is a variety of glass-lined evaporating and crystallisation equipment for which space is not available.

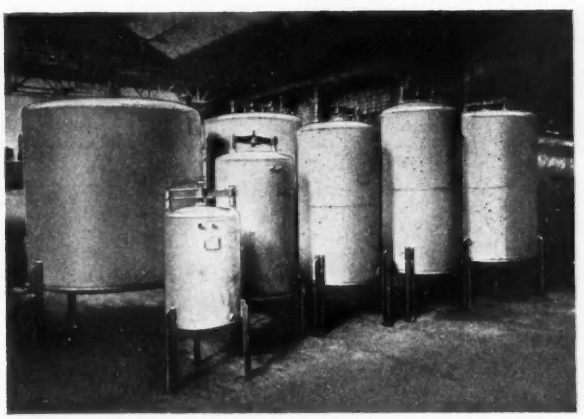
Standardised " Pfaudler " glass-lined storage tanks are built on a production basis. The " Intermediate " series are available both in single shell and jacketed constructions and can be obtained with various alternative accessories. The construction is welded and special sloping bottoms are provided to ensure complete drainage. These tanks are available in capacities from 28 to 320 gal., whereas the " Junior " series range from 5 to 80 gal.

Firth-Vickers Stainless Steels, Ltd.

Stand No. A.6

Recent advances in the technology of the application and fabrication of corrosion-resisting steels can be studied at this stand. In respect of fabrication, the introduction of acid-resisting steels which can be welded without fear of subsequent disintegration now makes it possible to construct the very largest units of plants by welding. Formerly the size of welded plant was limited to the capacity of the annealing ovens, but size is no longer of importance, as these new steels have eliminated the necessity for heat-treatment after welding.

The necessarily limited floor space of the stand does not permit a great variety of plant to be shown, but amongst other interesting exhibits there is an 100 gal. steam jacketed boiling



Group of " Staybrite " Steel Tanks, for the manufacture of high grade chemical products ; part of a contract for 102 made by Robert Jenkins and Co., Ltd., Rotherham, from Firth-Vickers " Staybrite " F.D.P. Quality Acid Resisting Steel.

pan built by Thompson Bros., of Bilston, a selection of " Staybrite " steel tubes and tube fittings by Talbot-Stead Tube Co., Ltd., an 80 qt. mixing bowl and two " Staybrite " steel buckets made by T. F. and J. H. Braime, Ltd., a sample drum fabricated by Frederick Braby and Co., Ltd., " Staybrite " steel tubes by Accles and Pollock, Ltd., and a " Staybrite " bucket by Jos. Sankey and Co.

Samuel Fox and Co., Ltd.

Stand No. B.7

This firm, which is associated with the United Steel Companies, Ltd., is showing welded containers and samples of plate and bar in " Silver Fox " new process stainless steels. These exhibits not only reveal the ease with which " Silver Fox " steels are manipulated, but show that the types free from weld-decay can take a high polish. The new process referred to is the high-frequency process which is particularly adapted for the production of non-corrosive and other special steels.

Grant and West, Ltd.

Stand No. A.5

Here are exhibited a number of specialities of interest to the chemical engineer. "Selek" is a material in powder form for jointing metal to metal, "Belfo" being a British product for the treatment of all forms of belting, whilst "Belfolene" is a thin, clear liquid which has excellent preservative properties. "Ropres" is a preservative specially designed for the treatment of steel wire ropes and cables.

Hadfields, Ltd.

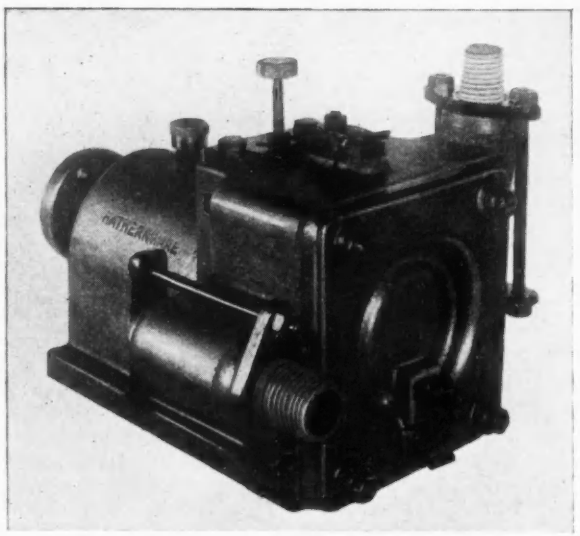
Stand No. B.3

At this stand prominence is given to "Era HR" heat-resisting steels and "Era CR" corrosion-resisting steels. "Era HR" steels are highly resistant to oxidising and many kinds of corrosive atmospheres up to 1,100° C., conditions under which they retain great mechanical strength and stability. These steels are supplied in all the usual cast or wrought forms, including seamless drawn tubings, and are of special interest to the chemical industry for applications such as heat exchangers, recuperators, parts of roasting furnaces, retorts and reaction vessels. For use in the manufacture of autoclaves, the "Hecla 134" steel has shown its value in plant for continuous hydrogenation operating at temperatures up to 300° C. and a pressure of 250 atmospheres. Indeed, this steel is now in general use in the construction of high-pressure plant for temperatures up to about 500° C., and where specially corrosive conditions do not operate.

Hathernware, Ltd.

Stand No. A.11

The position attained by this firm as makers of high-class chemical stoneware is well illustrated by its exhibits. The condensing tower, with bottom, middle and top sections and



This ¾ in. acid pump, an addition to the range of stoneware pumps made by Hathernware, Ltd., is suitable for use wherever a small regular output has to be maintained with safety and freedom, and is the first pump of its kind to be made in this country. It is of "single block" construction, i.e., the pedestal and pump body, with suction and delivery openings, are made in one piece of stoneware, a removable end cover being provided for inspection and cleaning. The impeller is also made of stoneware, permanently mounted on a steel shaft, and accurately ground and balanced. The gland is fitted with Gwynnes' patent stuffing box, and the packing requires the minimum of attention. The bearing housing, which is of cast iron, is let into the back of the stoneware block, and incorporates a ball thrust bearing. The pump spindle is fitted with a half-coupling for a small electric motor. All parts of the pumps which come in contact with liquor which is being pumped are made in high-grade chemical stoneware.

cover, perforated and distributing plates, is packed with rings (which are visible) of the Raschig type. The sections are made in a new "Greyware" material, which has a dense grey body covered by a brown glaze and possesses great resistance to mechanical and heat shock. Another exhibit of general interest to the chemical and allied industries is a large stoneware tank (available in capacities from 5 to 500 gal.), from which a ¾ in. stoneware pump circulates liquid through a stoneware pipe line, illustrating the use of conical-flanged piping with metal couplings. The pump is of single-block construction and is direct-coupled to a small electric motor; all the parts in contact with liquor are made of highest-grade stoneware, so that the pump can be safely used for acids, alkalies and corrosive liquids. An armoured 1½ in. stoneware pump, also shown, can be arranged either for belt or electric drive.

For use where one-piece stoneware is unsuitable, this firm makes stoneware tiles, and the exhibit comprises a section of a tank built up with white stoneware tiles. The tiles, which are either brown or white, can be used to line existing tanks or vats, or built up in chambers formed in concrete or blue bricks. Of particular interest as showing what is possible with precision-ground stoneware are the exhibits of spherical ground ball valves and a stoneware roller (mounted on a steel shaft running in ball bearings) as used for jig rolls in the textile industry and in paper manufacture, whilst there are also cone-end cocks and single and double-grooved block cocks, all with accurately ground-in plugs.

The firm's white stoneware, developed specially for use in the manufacture of pharmaceutical, food and similar products where any form of contamination must be avoided, is represented by a white glazed vacuum filter and a range of white storage jars with lifting handles and ground-in white stoneware taps.

The Hydronyl Syndicate, Ltd.

Stand No. A.13

Lessing contact rings have now been used for many years as a highly efficient packing for scrubbers, absorption and reaction towers, distilling columns and similar plant, and here they can be seen in various metals, stoneware, white stoneware and porcelain, and in sizes ranging from 4 inches to one-eighth of an inch. The special design of these rings gives them high drainage capacity, and this, together with the surprisingly small volume occupied by the metal, reduces the back pressure exerted by the packing to very small values indeed. The contact surface ranges from 19 sq. ft. per cu. ft. of tower space with 4 in. rings to 138 sq. ft. per cu. ft. with ½ in. rings. The free gas space corresponding to these rings is 0.73 and 0.61 cu. ft. respectively. A new departure is the first British-made carbon contact rings for use with highly corrosive acids or caustic alkali.

Glass towers of various diameters show the irregular packing of these rings, as in works operation, whilst larger rings are shown stacked in the way used for viscous liquids and slurries which have a high content of suspended solids. A working model of a scrubbing tower demonstrates the formation of films on the rings and the intimate contact which their use ensures between gas and liquid. Plants in which Lessing rings are utilised are illustrated by means of photographs.

International Combustion, Ltd.

Stand No. B.22

Here the well-known "Raymond" roller mill is erected complete with air-separating equipment and can be seen operating on various raw materials. In this mill three suspended grinding rollers are applied by centrifugal action against a stationary ring, the raw material being kept in the path of the grinding rollers by special ploughs, so that no material can pile up in dead corners and the machine always works at maximum efficiency. The powder produced is carried by suction to the separator above the grinding chamber, when the finely-ground material is carried to the cyclone collector by the air current, the coarse particles being returned to the mill. In this way the ground product reaches a controlled degree of uniformity and products with 99 per cent. passing 300 mesh are usual in industry.

The Hardinge constant-weight feeder ensures a uniform charge by weight of material to grinding mills and similar plant. Under normal feed conditions the variation in the characteristics of loose material must be met by running the machine below maximum to avoid overloading or racing. This difficulty is avoided if the machine is fed continually with a uniform weight of material.

The " Rotap " automatic shaker reproduces the circular and tapping motion given to testing sieves in hand shaking. Time is thus saved, and tests, even over a period of years, remain comparable; a sample can be analysed on a series of as many as 13 sieves of different mesh. The range of " Hum-mer " electric screens now includes a new model for small capacity workers. It has a 20 by 30 in. screening surface, has a single top vibrator and works off the ordinary lighting current.

International Electrolytic Plant Co.

Stand No. B.19

Knowles cells produce electrolytic hydrogen and oxygen of guaranteed purity and are constructed to suit all requirements. The standard type runs at 2.125 volts, and according to the number of electrodes will carry any load from 500 to 12,500 amp. or more. One exhibit at this stand is a cell fitted with 5 Knowles special electrodes. This cell, though of the same size as the standard cell with the same number of electrodes, will carry 1,000 amp. at 2.0 volts, generating 16.1 cu. ft. of hydrogen and 8.05 cu. ft. of oxygen per hr., with a consumption at 2 volts of 124 kW-hr. per 1,000 cu. ft. of hydrogen (measured wet at 20° C. and 760 mm. absolute pressure). A unique feature of this cell is that it will carry 100 per cent. overload at a cell voltage not above 2.3 for indefinite periods.

Knowles plants which are running in various parts of the world are illustrated by enlarged photographs. The rapid development of catalytic hydrogenation has created an ever-increasing demand for pure hydrogen free from catalyst poisons, and the International Electrolytic Plant Co. has supplied plants for ammonia synthesis, oil hardening, the hydrogenation of coal-tar products, the reduction of metals, and the manufacture of electric lamps.

S. H. Johnson and Co., Ltd.

Stand No. B.8

Filter plates and frames of various types and sizes, made in wood, iron and bakelite, are here displayed to show different constructions and washing arrangements. The special " Pyramid " drainage surface shows how an increased rate of filtration and better distribution can be obtained. The latest type of hydraulic closing and opening gear, and a 9 in. sq. filter press, complete on its stand with a belt-driven pump, are other outstanding exhibits. Another (6 in.) filter press on view is very useful for laboratory work or for small works where valuable materials are treated in small batches. A special filter press is supplied to handle china clay.

To illustrate the range of pumps available there is a weighted type of pump of a new design, specially made for feeding filter presses, and a special three-throw pump for working at high pressures. The 6 in. x 4 in.-stroke single-stage high vacuum pump is utilised for evaporation plant, and vacuum oil-refining and deodorising plants. Photographs of diaphragm pumps of various types recall their special utility for handling gritty and corrosive materials. Special materials are again used here according to the duty required. Double-plunger pumps can be constructed so that each side can be made to operate independently.

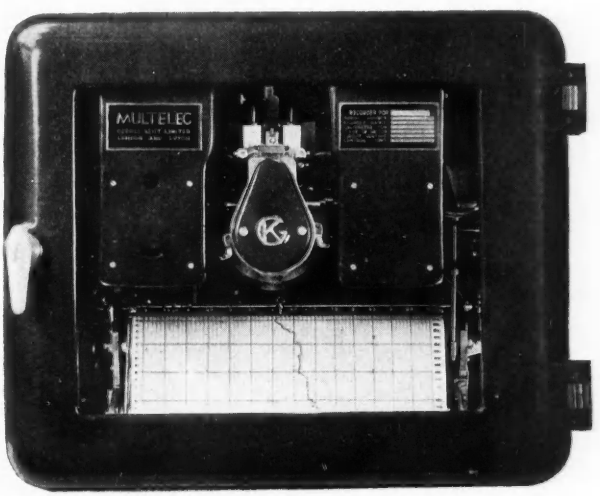
Of special interest is the model of a " Vortex " mixer in which a centrifugal vane near the bottom of a container forces the liquid outwards and imparts to it a rotary motion in a horizontal direction. Near the top of the mixer, curved plates deflect the upper layers of rotating liquid to the centre where the conflux of the streams from the different curved plates causes a vortex, so that all the liquid in the tank is rapidly circulated vertically as well as horizontally, giving uniform and intimate mixing. So powerful is the effect that large lead shot can be carried to the top and circulated with water. This mixer is thus most suitable for dissolving metals from ores, mixing heavy colours, mixing earths or decolourising carbons with oils, and similar operations.

Special filter aids are supplied by this firm, and a special filter cloth manufacturing service is maintained. Service to clients is ensured by a laboratory which examines customers' problems, and advises on the best procedure to follow, and there is even a small filter press which can be loaned for experimental work.

George Kent, Ltd.

Stand No. A.17

A new product which merits attention at this stand is the " Multilec " recorder. This instrument records and, if required, controls, with an extremely high degree of sensitivity, any condition such as temperature, conductivity, hydrogen-ion concentration, which, through the action of a primary element, sets up an electromotive force varying with the condition. A sensitive galvanometer of special design records the slightest change in the condition under measurement, and the recorder performs a measuring cycle roughly every 2.2 seconds, this speed permitting instant response to every change detected by the galvanometer. Standardisation of the current is automatically carried out every 43 minutes; temperature compensation is automatic, and the instrument is



The new " Multilec " Recorder exhibited by George Kent, Ltd.

highly flexible and will record and control on a variety of applications.

The " KM " differential, pressure type, flow recorder for steam, water, air, gas, oil and other fluids is also on view, together with Kent controllers, operated by compressed air, for pressure, temperature and liquid level. To avoid hunting, where the value covers too wide a zone, an Autocrat unit is provided for these controllers which gives a variable linkage between the pen and the pilot pressure and thus maintains the controlled quality exactly at the correct value. Kent recorders for temperature and pressure, and indicators for draught, are mounted on a panel with the combustion efficiency meter. This meter, of advanced design, comprises a steam-flow meter and an air-flow meter, and shows the state of combustion without any time lag.

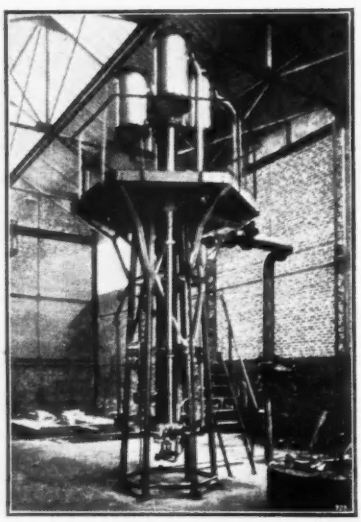
To illustrate the range of manometers, three types are shown, namely, the curved-tube manometer (used in conjunction with orifices or Pitot tubes), the replaceable curved mano-

meter of a somewhat simpler design, and a small micromanometer of outstanding sensitivity. A ring-balanced recorder for the measurement of low pressure gas or air is also on view.

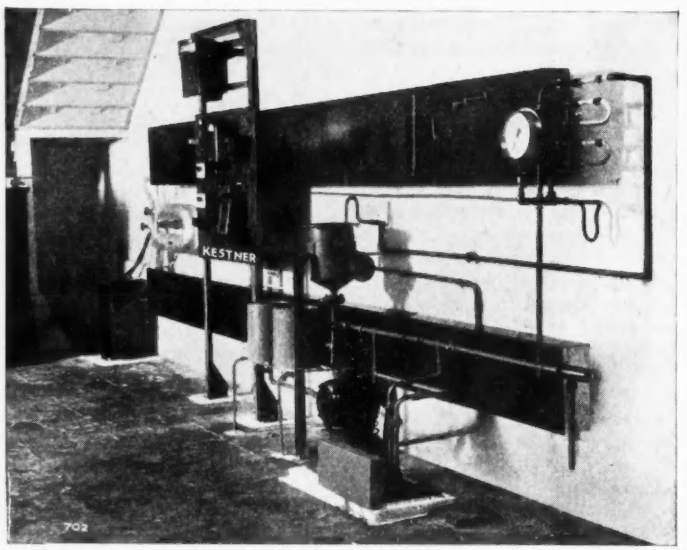
Kestner Evaporator & Engineering Co., Ltd.

Stand No. A.1

The high vacuum multi-circulation film evaporator, represented by a small plant with stainless steel contact, is a feature of interest at this stand. This evaporator is used particularly for sensitive products such as fruit juices, milk and the like, where low temperatures are essential and contact must be short. Actually, in the continuous type of evaporator the contact is as little as a few seconds in some cases, as with gelatine, tan extract, etc. Where high concentration is required, a finisher type of evaporator is used, which, for example, can produce tan extracts with some 80-85 per cent. of solids which set solid when cold.



Kestner Patent Triple Circulation High Vacuum Evaporator (left).



Kestner Patent Isolectric Continuous oil polymerizing Plant (right).

Another outstanding feature is a spray-drying plant, which is supplied in complete installations for the treatment of dilute liquors up to the finished dry product. Of the three types of the Kestner film drier, the non-vacuum, enclosed and vacuum machines, the enclosed machine is used to dry products with recovery of the vapours or where the material is poisonous and no dust may escape, whilst the vacuum machine is used when evaporation must be carried out at low temperatures. For use when material with a relatively low moisture content has to be dried, rotating cylindrical driers, tubular driers and trough driers of various types are supplied.

Further progress is to be noted in the application of the "Merilene" hot oil-circulation heating plants, of which some 400 are now in use in different countries for processes where high temperatures up to 600° F. are required. The even heating afforded by this principle finds application in high-temperature reactions, dyestuffs manufacture, still heating, varnish and synthetic resin manufacture and so on. It is to be noted that where still higher temperatures are required, other systems working on similar principles are available. An interesting development is the use of electricity as the source of heat and as an example of this type of plant, which is finding increasing application for the heat treatment of linseed oil and the like, an "Isolectric" plant is shown, which is a continuous unit for the heat treatment and polymerisation of tung oils, etc., for which the accurate temperature control and quick and uniform heating characteristic of the process are especially valuable.

A variety of pumps, with and without glands, for the handling of acids and corrosive liquors reminds one of the extensive range available, and the typical horizontal lead-lined fan impeller for handling corrosive gases recalls that the firm specialises in homogeneous lead lining. A portable electrically driven stirrer is shown working, and for larger scale work there is shown the effective "Vortex" stirrer, with its flexible bearing which eliminates any internal footstop or other bearings in contact with the liquid.

Thomas Locker and Co., Ltd.

Stand No. B.13

A special display of screening and handing equipment is to be seen at this stand, where the exhibits include a "Locker-Rotex" screener with its ball-and-bevel mesh-cleaning device, "Locker-Trayco" feeders and conveyors, and a range of wire cloth, wire gauze, and perforated sheets, in all metals including 200-mesh "Staybrite" steel.

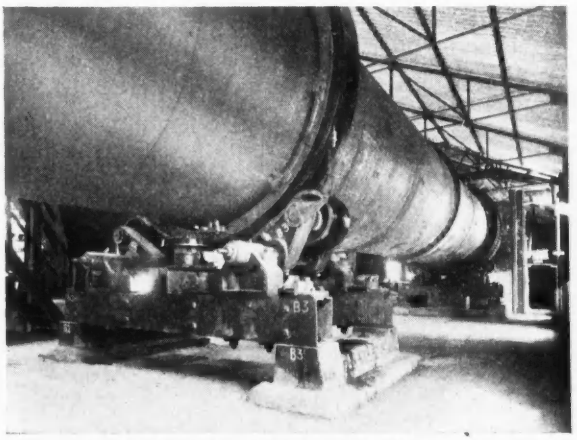
The "Locker-Rotex" screener is of particular interest to those faced with problems in the screening of fine chemicals, since the unique method of cleaning the mesh obviates any possibility of "blinding." The ingenious arrangement of the three "Locker-Trayco" vibrating feeders, working in closed circuit, demonstrates in a marked manner the amazing possibilities of these machines for the feeding of chemicals and reagents, while the model fitted with vibrating hopper is particularly suitable for materials which tend towards clogging. Another item of interest is the "Locker-Trayco" liquid lift.

Manesty Machines, Ltd.

Stand No. B.18

A comprehensive range of Manesty water stills is on view at this stand. Automatic in action, these stills produce distilled water in amounts ranging, according to type, from 3 pints to 50 gal. per hour. The smallest model is gas heated and is often specified where a moderate, steady supply of distilled water is required. Among other types, there is an electrically heated still and another heated by a Primus paraffin burner supplied from a large-capacity pressure tank. The larger stills are steam heated and produce distilled water at a cost of a fraction of a penny per gal. The construction of all these stills is of the highest class, they require no attention, and, being mounted on a wall bracket, do not take up valuable floor space.

Manesty tablet-making machines form another feature of the stand. The "D" rotary tablet machine, which is in operation, will preform bakelite moulding powder at a rate of 300 to 350 tablets a minute. Tablets up to seven-eighths of an inch can be made, the sizes and shapes of the tablets being varied by using suitable punches and dies.

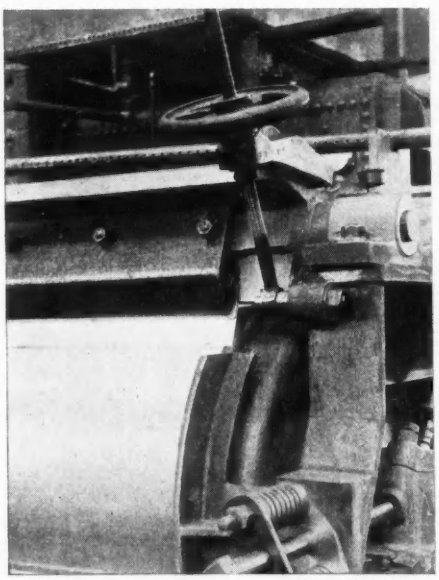


Large rotary fire-heated dryer, 8 ft. diameter by 60 ft. long, as supplied for handling clay. The furnace is fitted with Riley automatic stokers, the makers of the dryer being Manlove, Alliott & Co., Ltd.

Manlove, Alliott and Co., Ltd.

Stand No. B.18

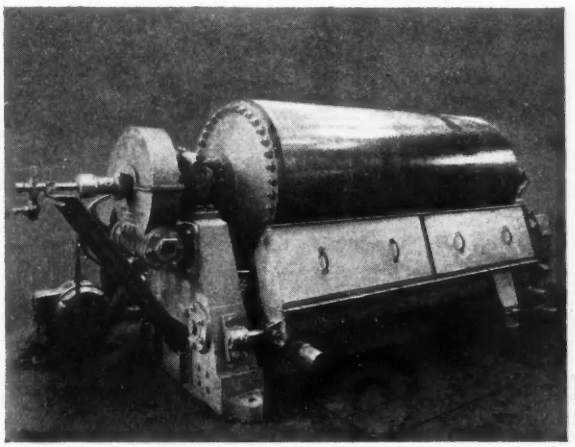
The most interesting items among the array of filters at this stand are two sterilising filters. One of these is mounted on a stand with wheels and will take 20 films, whilst the other takes from 2 to 6 films and is arranged for wall mounting. Both take films of 30 cm. outside diameter. The larger filter is mainly used for beer and beverages in general, whereas the wall-mounting type is perhaps more usually employed for water. Hitherto, filters of this type have been made in Germany, mainly because the films were developed there. The films, however, are now being manufactured in England by a reliable firm, so that it is possible to obtain a complete



This illustration shows a portion of one of the twin roller drum dryers made by Manlove, Alliott and Co.Ltd. It illustrates particularly the very simple fastenings of their "Easifix" type of knife. This knife is suitable for a very wide variety of product and can easily be taken out and replaced without any need for adjusting numberless small screws, with danger of scratching the roller or leaving portions unscraped should the adjustment not be perfect

outfit of British manufacture. It may be added that these filters have no cake space and are intended to handle liquids which are already clear in the ordinary sense. They remove minute quantities of bacteria and very fine suspended matter which might cause cloudiness to develop subsequently in the liquid on storage.

The small and medium-sized enclosed pressure filters which are exhibited were mainly developed for drying-cleaning fluids, but find extensive application wherever clarification has to be performed. The "Easifilt" filter opens like a book-cabinet to display the battery of leaves which can be slid out on arms, so that the cake can be scraped down into a trolley.



Drying drum or "film" dryer, 4 ft. diameter by 8 ft. 6 in. long, equipped with reciprocating type knife and side trough feed, as supplied by Manlove, Alliott & Co., Ltd.

The "Radford" filter is a new machine of the same class, which gives a maximum of filter area at a relatively low cost. It contains a battery of leaves which are segments of circles mounted on a header that can be drawn out of the horizontal cylindrical body. The leaves are easily dismounted and can be cleaned and reclothed very rapidly.

In the section devoted to drying plant there is a model drying drum or film drier with traversing knives. Another striking feature at the stand is the running ring and gear wheel for a 4 ft. tubular rotary dryer, mounted on its under-gear and rollers, and accompanied by large rotating models. Of these one shows the action of large serrated lifting shelves for ordinary materials, and the other shows the distribution given by one out of many possible forms of radial path distributors.

R. Marsh and Co.

Stand No. B.16

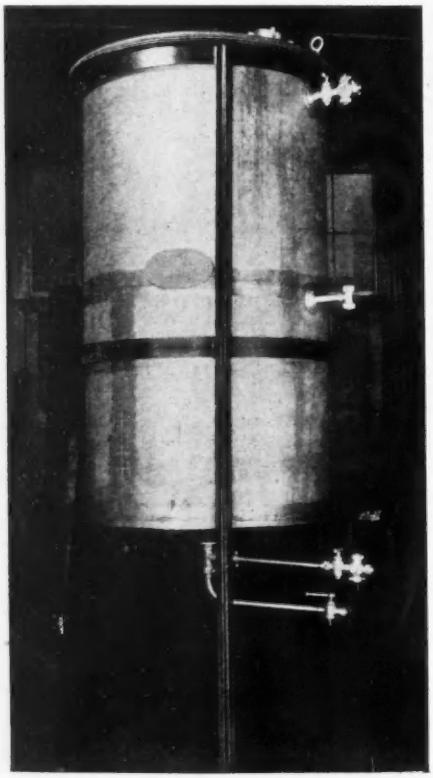
One of the oldest methods of protecting vessels from corrosion is to apply a lining of sheet lead, loosely applied but secured to the vessel by lead-covered bolts spaced at regular intervals. Lead linings, however, tend to sag after a short time under working conditions, so that cracks occur which permit the acid or other fluid to obtain access to the vessel and set up corrosion. The only satisfactory way to overcome this difficulty is to apply a homogeneous lead covering to the vessel. Such homogeneous coverings are shown at this stand, the process used being a British one.

Homogeneous lead coverings can be applied to all types of plant, whether working under pressure or vacuum, without blistering or parting from the outer container, and it will withstand vibration, such as is often met with in vessels working with agitating gear. Homogeneously lead-lined vessels are supplied for plant such as acid eggs, evaporators, benzol washers, acid filters, saturators, vacuum vessels, coils, etc. It is often advantageous that the complete vessel, *i.e.*, both the steel and lead lining, should be constructed together, and in this connection it should be noted that R. Marsh and Co. are in a favourable position to utilise the services of nearby boiler and tank makers, Towler and Sons, Ltd.

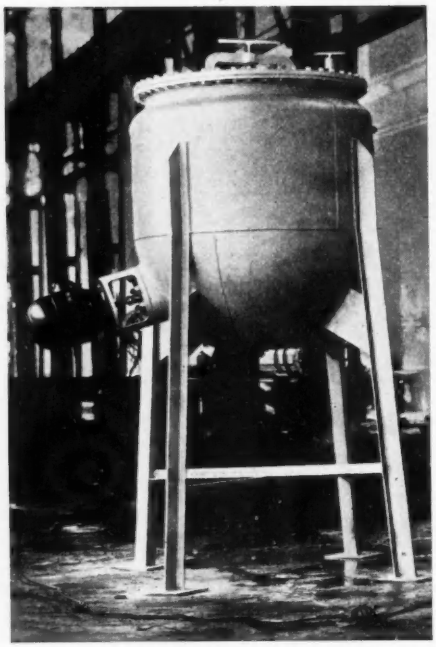
Mond Nickel Co., Ltd.

Stand No. B.17

The exhibits at this stand are fabricated in different materials which all incorporate nickel. "Ni-resist" is essentially an alloy of cast iron with nickel and copper, which has a tensile strength of some 15 tons per sq. in. and is tougher than ordinary cast iron. It is widely used where corrosive media are present. In contact with weak sulphuric acid, for instance, "Ni-resist" is 300 times more resistant than cast iron.



Gin Storage Tank in Inconel made by G. Hopkins & Son (Clerkenwell) Limited. (By courtesy of W. and A. Gilbey, Ltd.)



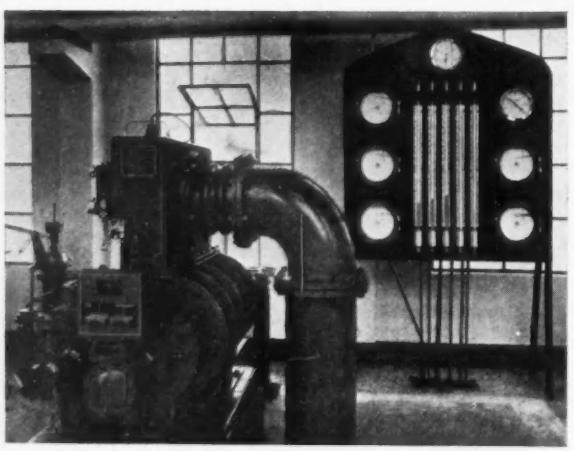
The main body of the Struther-Wells swift working mixer is made of nickel clad steel. The Agitator and shaft are of Monel metal. This mixer is used in rubber processing.

"Inconel" is a comparatively new alloy of nickel, chromium and iron, which has excellent mechanical properties, combined with important qualities of resistance to corrosion and heat, and is amenable to fabricating operations. Both when cold-worked and annealed, the alloy possesses full corrosion-resistance and freedom from corrosion embrittlement. In the cold-worked condition, a tensile strength as high as 85 tons per sq. in. is feasible. Developed originally for milk-handling equipment, it has since been found useful for various applications for chemical plant, particularly for foodstuffs. Monel metal is remarkable for its corrosion-resistance and its strength, comparable to that of steel.

Negretti and Zambra

Stand No. B.15

This stand is devoted to a display of instruments for indicating, recording and controlling a variety of operating conditions. One set of instruments serves to indicate, record and control temperatures, humidity and pressure. The remarkable results obtained in temperature control with these instruments are due to the sensitivity of the element, its reduced time lag, its accuracy and its reliability. Compressed air, easily and cheaply produced, is used to operate the control valve, thus leaving the sensitive element free as a directing force to control the auxiliary power. The instruments can be used with steam, water, gas or electricity, and they will regulate the temperature much closer than is possible by hand. Mercury-in-steel types are used for temperatures up to 1,200° C., and thermo-electric types up to 1,400° C.; in the latter type the auxiliary power is electricity and not compressed air.



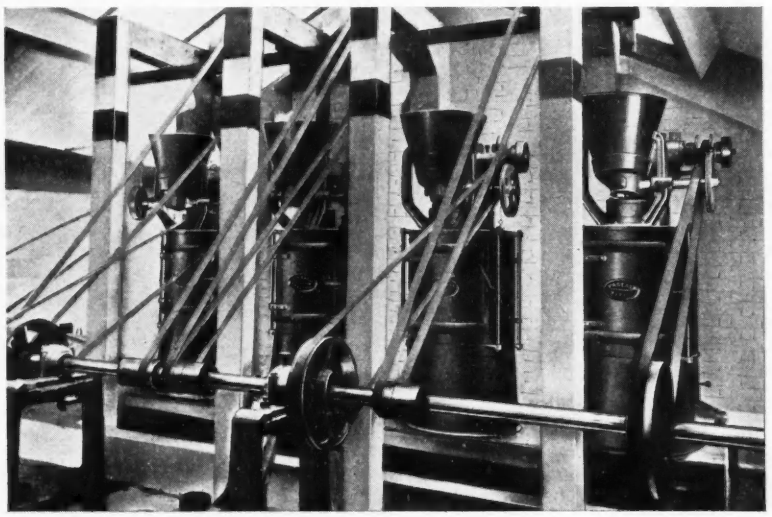
The coke oven and by-product plant of the Grassmoor Co., Ltd., is kept under complete control by means of suitable instruments and recorders installed by Negretti and Zambra on a central instrument panel as illustrated above.

A similar variety of type is found among the draught and pressure gauges, the dial and edgewise diaphragm draught gauges being much used to indicate small pressures or suctions in boiler plants, gas plants, brick and cement kilns, furnaces, ventilating and exhausting fans, etc. The diaphragms are made of a non-corrosive material with high elastic properties, errors due to hysteresis, friction, creep, etc., being practically eliminated. Other exhibits include pressure and vacuum gauges of the liquid type, a contents gauge for use with petrol, oil, or acid in tanks, combined pressure and temperature recorders, electrical thermometers, and mercury-in-steel thermometers.

Pascall Engineering Co., Ltd.

Stand No. B.31

Three fundamental operations of chemical engineering can be studied at this stand. The "Reddrop-Periflo" centrifugal grinding and blending mill, which works on the pinned disc principle, owes its name "Periflo" or "peripheral flow" to the fact that there are no restricting passages or lugs at the periphery of the discs, which ensures freedom from clogging. The Pascall turbine sifter is silent running and free from vibration, the rate of input being synchronised with the speed of the turbines, the rotors of which, driven at constant speed, sweep the product at a constant angle against the cloths, either of metal or silk, which are clamped in place. The "Turbine" wet mixer incorporates a high speed turbine paddle which produces great turbulence, the liquids being distributed round an outer drum, then drawn through an open-



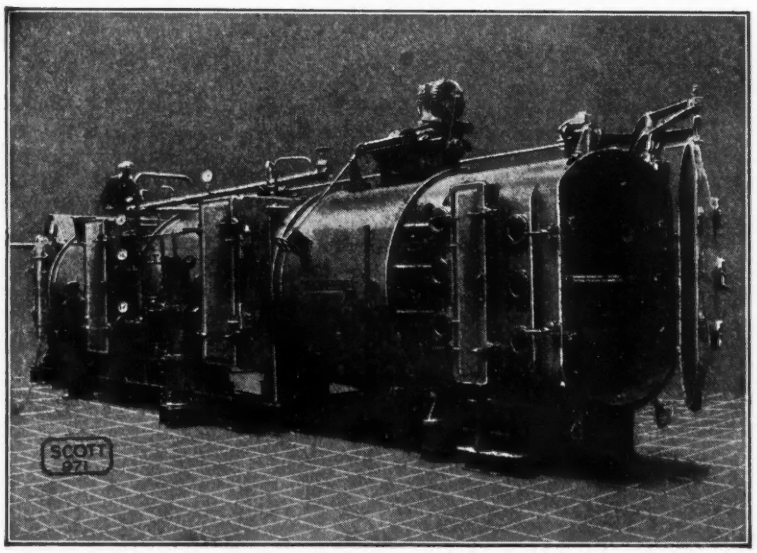
An interesting installation of four " Pascall " sifters at Macleans' factory, Great West Road.

ing at the foot of an inner drum, returning through specially staggered slots in the inner drum until mixing is perfect.

Premier Colloid Mills, Ltd.

Stand No. A.19

Emulsification is the speciality of this firm, who were the pioneers of the colloidal mill industry in this country. The latest development in high-speed emulsifiers is the 5 in. horizontal " Premier " corrugated mill, which is a definite advance on the standard " Premier " mill. The corrugated mill is so-called because the co-operating faces of the rotor and stator are provided with corrugations in such a way that the clearance between the rotor and stator gradually decreases from the point of inlet towards the periphery. In this way the hydraulic forces become automatically progressive in action and greater disruptive forces are available. This mill is intended for use in the more difficult problems of emulsifications and, briefly, some of its advantages are that emulsification is progressive; the time during which disruption takes place is increased, thus giving more time for absorption of the stabiliser; and no air is present in the working film so long as the filling funnel is kept full.



The band dryer illustrated above is typical of the very wide range of plant made by George Scott and Son (London) Ltd. This type of dryer is essentially intended for the low temperature drying of very delicate products. It is arranged for continuous working and it is capable of very complete control during all stages of drying. A small size of this type, intended for the testing out of various materials in an experimental manner, is being exhibited. It could be used as a commercial unit for the drying of very valuable medicinal products.

Saunders Valve Co.

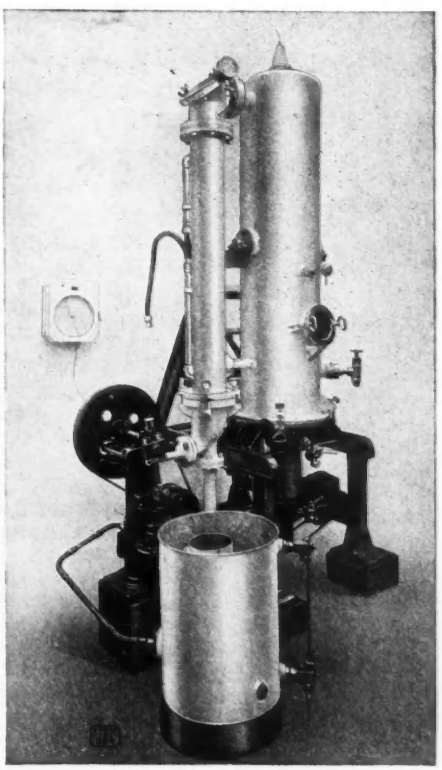
Stand No. B.9

The Saunders valve shown at this stand is so designed that when it is open there is an unobstructed streamline flow for the fluid. The bonnet containing the operating mechanism remains isolated from the fluid and no leakage is possible while the diaphragm remains intact. A screw mechanism operates the compressor which forces the diaphragm down on to the central weir, or seat of the body, thus closing the valve. A special mechanism supports the diaphragm in all positions so that it is not subjected to strain and the diaphragm is guaranteed to have a minimum life of two years under ordinary conditions. The body of the valve is available in cast iron, cast iron lined with glass enamel, semi-hard rubber and lead, or in acid-resisting bronze.

George Scott and Son (London), Ltd.

Stand No. B.23 and B.28

This firm of general chemical engineers is exhibiting in company with the Enamelled Metal Products Corporation (1933), Ltd., and Henry Balfour and Co., Ltd.



The complete milk condensing plant, here illustrated, has been built by George Scott and Son (London) Ltd., for research work on all types of condensing problems in connection with milk and milk products. It is worked on the Scott patent forced circulation principle all contact parts being in stainless steel or " Pfaudler " glass lined steel. The complete accessibility of the plant is a noticeable feature. This unit although designed essentially for experimental work, also has a commercial application for pharmaceutical work on special extracts. It has been supplied to the Hannah Dairy Research Institute, at Kirkhill, Ayr.

The three Scott exhibits are quite novel. The full possibilities of the Scott high vacuum distillation plant shown cannot yet be completely visualised. The small unit is designed to distil various organic bodies under high vacuum and follows on a small scale the lines of two plants already in operation, of which one is distilling an organic body at absolute pressures of 2-3 mm., the corresponding boiling temperature being 260° C. The other plant is working on glycerine at pressures of about 1-3 mm. abs. Under these conditions and with dry saturated steam at up to 150 lb. pressure, 75 per cent. of the glycerine treated is obtained in a form which, after mild bleaching, yields a pure B.P. glycerine. The still is equipped with the Scott forced circulation device and the vacuum is produced by special steam jets (not shown) working either alone or in conjunction with a vacuum pump. The exhibit has a flash-type, gas-fired boiler, using a high boiling organic product in lieu of steam; it works at temperatures as high as 400° C.

The drying chamber of a Scott vacuum continuous band dryer shows the special system for collecting the dried product and reducing it to a very fine division, where necessary, under vacuum. The product can thus be packed directly into vacuum containers if required. The intensity of heating at different stages of drying can be varied, and as the plant is continuous, there is no handling of the product as in the intermittent batch dryers. The design is suitable for the heat processing of materials which can be fed to the machine as viscose liquids and pastes and which are now handled in batch dryers. Scott dryers of this type installed in Great Britain are producing some 75 tons of dried delicate products per day. The exhibit is a single band machine of the smallest size, useful for experimental work and for drying valuable chemical, medicinal and other products.

The Scott forced circulation evaporator is a small unit belonging to the Hannah Dairy Research Institute, Ayr, and is designed for research work. The tubular element is of Staybrite steel and the top pan is of "Pfaudler" glass-lined steel. Both top and bottom pans can be removed for inspection and cleansing. This design is extensively used for the concentration of milk, whey, malt extract, glycerine, and on salting and viscous liquors.

Siebe, Gorman and Co., Ltd.

Stand No. B.25

Amongst the exhibits at this stand will be seen armoured, leather, rubber and other gloves for stokers, handling acids, etc.; asbestos fire-fighting equipment and clothing; oil-skin clothing for working in contact with oil; acid-proof clothing, welders' helmets, and many other protective devices. The selection of industrial goggles is particularly complete, and there are gas masks for every use. These appliances are highly efficient and perfectly comfortable to wear. Various types of dust respirator are provided for protection against different kinds of dusts, one type affording protection against dust particles a fraction of a micron in size. In the improved "Pulvasorb" dust respirator the exhaled moisture-laden air is prevented from passing out through the filter and thus increasing the breathing resistance.

Self-contained oxygen breathing apparatus for work in irrespirable atmospheres includes the "Proto," "Salvus," and "Fireox" types, which have been extensively adopted by chemical works, colleries, gasworks and iron and steel works. The "Antipoys" apparatus is designed for work at a short distance from fresh air and is often accompanied by the special safety belt for use in oil tanks and other spaces with a dangerous atmosphere. The "Puretha" (Mark IV) is probably the finest gas mask made, and canisters are stocked which afford protection against numerous gases, ranging from ammonia to phosgene, hydrocyanic acid and nitrous fumes.

George Skey and Co., Ltd.

Stand No. B.11

At this stand there is a display of chemical stoneware which resists all acids (except hydrofluoric acid) and alkalies, as well as reasonable extremes of heat and cold. This stoneware body needs no glaze, except when used to make vessels such as crystallising pans, plating tanks, mixing and dyers' pans, etc., which require a surface that can be cleaned easily. Special ware is made for processes involving thermal shock or thermal conductivity, as well as non-conductive electrical wares.

Stevens and Manning

Stand No. A.16

Devoted to sieves, wire gauzes and sifting machines, this stand makes a prominent feature of stainless steel gauze for several good reasons—economy, strength, long life, resistance to corrosion, cleanliness—are given to show why those who require a wire gauze should acquire one in stainless steel. Comparative tests with this material have shown that one piece of stainless steel gauze was in use for two years, whereas, on the same work, phosphor bronze had to be changed every two or three months. Stainless steel gauze is woven in many meshes from 8 mesh to 200 mesh.

Tintometer, Ltd.

Stand No. A.2

Those who have neglected to follow the development of the Tintometer will be agreeably surprised by the new instruments which are shown at this stand. The new form of apparatus is applicable to all colorimetric determinations within the limit of human vision and overcomes the disadvantages of the old form, such as difficulty of repeating readings, work laborious and fatguing to the eyes, difficulty of building up definite colours, etc. The Lovibond Tintometer (British Drug Houses pattern) is designed to meet the requirements of laboratories and works for a convenient form of colorimeter. Selections of the well-known red, yellow and blue colour scales are provided to enable the matching of any colours. The Lovibond comparator, consisting of a handy bakelite case, is a smaller apparatus which enables hydrogen-ion concentration and quantitative tests of many liquids to be carried out. This apparatus possesses a set of *permanent* glass colour standards which are comparable with solutions of known hydrogen-ion concentration containing various B.D.H. indicators.

Tungstone Patent High Pressure Die Casting Co.

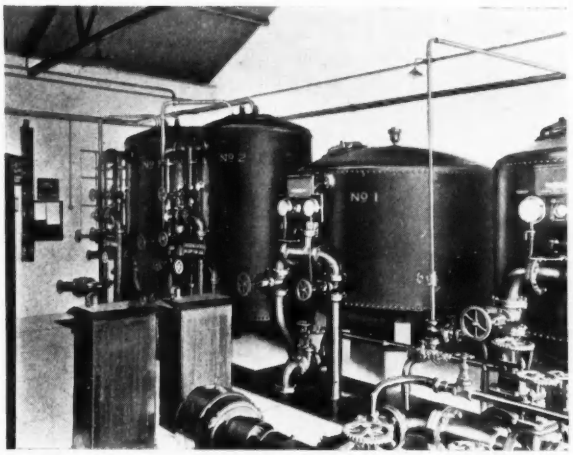
Stand No. B.27

The Tungstone acid pump here exhibited does not possess pistons, stuffing boxes, glands, rotating parts or other energy-consuming devices; it is actuated by air-pressure, but contrary to the acid egg, it can work continuously and has no air-lift or churning action. Its value for pumping acid liquors is shown by the number of these pumps that have been installed to handle sulphuric acid and other corrosive liquids. It is also suitable, owing to its absolute freedom from danger of choking, for handling gritty fluids containing large amounts of solid matter. There are two types of pumps, one which is immersed in the liquid to be pumped and one which is not so immersed. Both types are made in capacities from 375 to 30,000 gal. per hour. Installation is particularly cheap and easy as no foundations or bed-plates are required.

United Water Softeners, Ltd.

Stand No. B.32

One of the features of this stand is a small-scale model of a comprehensive water-treatment plant which has been supplied to a well-known iron works in the Midlands. The plant has a capacity of 240,000 gal. per day continuously for 24 hours a day, and provides for the complete treatment of the canal water which is fed to the boilers. Owing to the nature of this water,



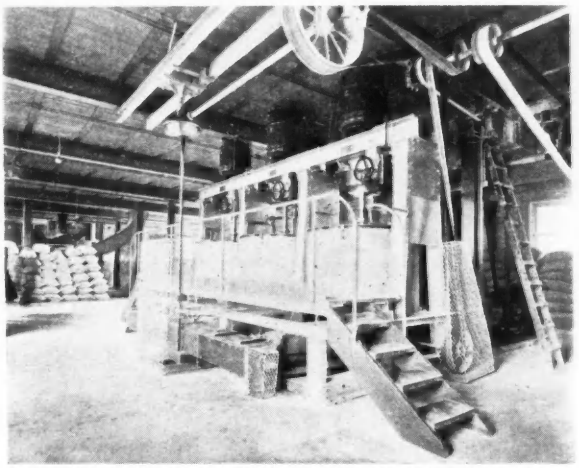
Base exchange softeners and marble filters installed by United Water Softeners, Ltd., at the works of the Stanton Ironworks Co., Ltd., at Nottingham.

lime-soda tretament has been adopted, followed by base exchange softening, after neutralisation of the excess alkalinity. Another exhibit consists of a sectionalised model of the standard " Permutit " base exchange manually operated softener for industrial use, which is fitted with a non-corrodible brine tank and an arrangement for siphoning the brine solution into the softeners.

Watson, Laidlaw and Co., Ltd.

Stand No. B.1

As one example of the centrifugal machines in which they specialise, this firm is exhibiting a 36 in. centrifugal machine for chemical work. This machine is belt-driven, but it can be modified for independent steam or electric drive, and the basket is of mild steel, designed to run at the standard speed of 1,100 r.p.m. The safe working load is 452 lb., but the same type can be obtained in capacities ranging from 190 to 866 lb., the speed of the basket, of course, falling somewhat at the higher capacities. The basket has a central bottom discharge valve through which the dried contents are discharged into a conveyor, bin or other receptacle, whilst the liquid is discharged through the outlet spout in the monitor case. Besides mild steel, baskets can be made of a variety of materials to meet corrosive conditions. Thus copper, bronze, Monel metal, stainless steel, aluminium or steel covered with vulcanite are used. A basket made entirely of Monel metal is shown on the



Three electrically driven centrifugal machines installed by Watson, Laidlaw and Co., Ltd., in a large starch factory. This installation of 48 in. by 24 in. centrifugal machines was specially designed for drying starch. To permit of quick and easy cleaning of the basket the monitor case covers are made flat and can be quickly removed by hand. The baskets, linings and discharge valves are made of copper, while monitor cases are lined with vulcanite to resist corrosion.

stand, and it is of interest to note that this firm was a pioneer in the art of spinning Monel metal to make baskets for centrifuges.

For the handling of free-drying crystalline and granular materials, the self-charging basket effects a considerable saving of time and labour and gives an increased output.

Oil and Colour Chemists

Manchester Section's Summer Meeting

DESPITE weather conditions which hardly suggested the time of the year, 77 members of the Manchester Section of the Oil and Colour Chemists' Association and their guests travelled to Marbury Hall Country Club for the summer meeting on June 13. The surroundings and arrangements were excellent, and thanks are due to Mr. Gosling and the committee for the organisation. A number of sports events were organised, these being in charge of various members, and they proved very attractive.

On the putting green, competition was very keen, and without detracting from the performance of the winners of this section, it is only fair to say that the course was so delightfully hazardous that " luck " was a greater asset than " skill." The winners here were Mr. Folds and the lady Mrs. Cowey. Tennis enthusiasts were able to keep themselves warm and probably found the conditions rather more congenial than if it had been a really fine day. This event was well supported, and even though started in good time, there still remained a number of games to play after supper, which was taken at 7.30. Winners of the tennis tournament were Mr. Asquith and Mrs. Bains. The chilly conditions made it advisable to withdraw the swimming sports which had been included in the original schedule. Despite this, however, a number took the " splash," noticeably the chairman, Mr. S. T. Kinsman, who led the first " sally." After supper the party joined in dancing in the ballroom.

Oil Possibilities in Britain

Sir John Cadman Foresees Moderate Production

LARGER profits and an increased dividend were reported at the annual meeting of the Anglo-Iranian Oil Co., Ltd., in London, on June 11. Sir John Cadman, chairman, referred to the commencement of work on the first oil well in the South of England last March and stated that a second well would be started shortly. In addition, surveys were being conducted over large portions of the licensed areas.

Prospecting for oil was a highly speculative enterprise, which needed the backing of long experience and adequate finance. The volume and type of evidence which had been obtained in Great Britain were, however, of the kind on which the company would normally undertake prospecting activities in other countries. Although the decision to drill was made principally on the basis of this evidence, the very special value of indigenous supplies of petroleum was an additional and cogent consideration.

Present geological information did not suggest the existence of deposits comparable with the world's major fields; and they did not, at the best, envisage the possibility of more than moderate production. The investigations were being carried out with all the aids that science and modern technique could provide. The answer, however, to the question: " Does oil in commercial quantities exist?" lay only with the drill. He would not attempt to predict the outcome of the search, but it was the company's intention to put beyond doubt the question whether oil existed in commercial quantities or not.

Research in Aid of Industry

Exhibits of The Department of Scientific and Industrial Research

THE chief object of the Department of Scientific and Industrial Research is to assist British industry in the application of the results of scientific research. It operates through its own establishments, such as the National Physical Laboratory, the Fuel Research Station, the Chemical Research Laboratory and many others, or through autonomous co-operative research associations of which some twenty are now functioning with the assistance of the Department, covering practically all branches of the metal, textile, electrical, and other industries. The Department works in accordance with the recommendations of an Advisory Council composed of eminent industrialists and men of science, of which the chairman is Lord Rutherford.

The exhibit staged by the Department in the Conference Hall at the British Chemical Plant Exhibition illustrates some of the directions in which research carried out under the auspices of the Department is assisting the British chemical engineering industry. Several of the exhibits are being further illustrated by short cinema films. Visitors will also find members of the staffs of the co-operating organisations in attendance to answer their inquiries, whilst technical reports issued by the Department of Scientific and Industrial Research may be procured at the information bureau in the hall.

Applications of Cast Iron

The exhibit by the British Cast Iron Research Association consists mainly of castings for use in the chemical industry as manufactured by various members of the Association. Cast iron undoubtedly has many diverse applications in the chemical industry and it is being used more and more as our knowledge increases. For instance, the advent of austenitic cast iron, which has superior corrosion-resisting properties when compared with ordinary cast iron, has resulted in substantial savings to the industry. This type of cast iron now has many applications.

Iron and Steel

In another section the Industrial Research Council of the British Iron and Steel Federation illustrates the comprehensive scheme of research now being carried out, at a cost of many thousands a year, under the guidance of the Iron and Steel Research Council with the co-operation of the Iron and Steel Institute and with the support of the Government through the Department of Scientific and Industrial Research.

Many manufacturers and users of chemical plant are already familiar with the six reports of the Heterogeneity of Steel Ingots Committee and the recently published summary of the work of the last twelve years. They will also be aware of the three reports of the Corrosion Committee and the first report of the Steel Castings Committee. Whilst the researches of these three committees are of direct interest to chemical plant manufacturers, the work of many others is of indirect interest in so far as it touches upon the manufacture of chemical plant. The various stages in the production of a huge hollow forged reaction chamber are illustrated in a series of eight transparencies, as a subsidiary part of the exhibit. Finally, attention should be drawn to the link between this part of the iron and steel exhibit, which illustrates the manufacture of these great vessels, and the portion of the exhibit of the Fuel Research Station which illustrates the industrial use of such plant in the hydrogenation process for the extraction of oil from coal.

Refractories for Metallurgical Research

Research work on metals of high melting point, such as iron, call for the use of refractory materials which have sufficient strength at very high temperatures and are sufficiently chemically resistant to prevent the contamination of the metals melted. Pure alumina has been found very useful for this purpose and the technique of making crucibles, etc., from this material, which is not plastic, has been developed at the National Physical Laboratory. Thoria can be used in a few instances in which alumina may be attacked by the molten metal. Vessels of these two materials are exhibited.

Heat-Insulating Materials for Pipes

A large drawing showing the electrically heated pipes employed for testing the efficiency of heat insulating pipe-covering materials, and the method of correction for end loss, is also exhibited by the National Physical Laboratory. In addition to the efficiency or saving effected by comparison with bare pipe conditions, the surface temperature of the cover is measured, enabling the thermal efficiency of the covering to be calculated. Pamphlets are available at the information bureau which describe the method of test, give the average values of the heat loss from various materials and illustrate the method of calculating the heat loss from pipes differing in size from the test pipe.

Heat Transmission

Research is at present in progress in the Engineering Department of the National Physical Laboratory on the behaviour in heat transmission of pipes of other than circular section, and of artificially roughened circular pipes. The methods employed and the results so far obtained are illustrated. A schematic diagram of the apparatus used is shown, and samples of the flat and artificially roughened pipes used in tests are exhibited. The effect on the heat transmission coefficients of a change in the heat transporting medium is shown by curves. It has already been established that square and rectangular pipes behave like circular pipes of the same hydraulic diameter.

Flow of Heat through Metal Tubes

The British Electrical and Allied Industries Research Association has undertaken two investigations of the flow of heat from one fluid to another through metal tubes. The first of these was a measurement of the flow of heat from a heated metal tube to a stream of water flowing through the tube. A diagram of the apparatus employed in the experiments is exhibited, together with curves showing the coefficient of heat transmission for tubes of different sizes. The second research measured the rate of condensation of steam upon horizontal brass tubes. The exhibit consists of a photograph and a diagram of the apparatus; photographs of drop-formations on the tubes; curves showing the thermal resistance to heat flow for single tubes and for two arrangements of grouped tubes; and curves showing the effect of mixing air with the condensing steam. The results of these experiments have provided improved data for the design of surface condensers and similar apparatus.

Steels at High Temperatures

Another exhibit by the National Physical Laboratory illustrates research in progress in the Engineering and Metallurgy Departments of the Laboratory for a Joint Committee of the British Electrical and Allied Industries Research Association and the British Iron and Steel Federation, dealing with the creep and corrosion of carbon and alloy steels. Carbon steels of 0.15 per cent. and 0.40 per cent. nominal carbon content have been tested at 450° C. after various heat treatments in order to assess the effects of carbon content and structural conditions upon creep characteristics, and significant curves and microstructures are shown. Curves and photographs are also shown which illustrate test results obtained on molybdenum steels of different heat treatments

which have been tested in creep at 550°C. A comparison can be made of these curves with those for the carbon steels at 450°C. The work in hand involves a study of the effect of additions of such elements as vanadium, tungsten, titanium, copper, manganese and chromium to molybdenum steels. Photographs show the methods of test and micrographs obtained in the work on the behaviour of mild steel of 0.15 per cent. carbon content under steam corrosion conditions at atmospheric and high pressures.

Coal and its By-Products

The Fuel Research Station at East Greenwich, and nine laboratories in the coalfields, are now engaged in examining the coals of the country, and studying various processes involved in their preparation and use.

The Fuel Research Coal Survey is examining and recording the properties of every coal in Great Britain in the interests of the coal industry and national economy, with a view to present and future devolopments in methods of utilisation. The work consists in the detailed physical and chemical examination of the coal seams as they occur below ground and of the various grades as they leave the pithead for the market. The results show where coal of any particular quality is to be found, and how, when raised, it can best be graded and prepared for the market.

Pulverised Fuel

Explanatory diagrams and a model are shown of a device which enables a non-uniform stream of air-borne powdered fuel to be divided into two or more equal parts, each containing the same proportions of air and coal and the same grading of the powdered coal particles. It was designed originally to supply the two furnaces of a Lancashire boiler from a single mill and it is being used successfully for this purpose in commercial applications.

The " grid " burner, another exhibit by the Fuel Research Station, is designed to give the maximum possible control of the proportions of air and fuel at the time of ignition, and of the rate at which additional air is subsequently supplied to the fuel particles. It is being used commercially in Lancashire boilers and in rotary melting furnaces for both of which purposes it is particularly adapted. The exhibit consists of explanatory diagrams and a burner rated at 700 lb. of coal per hour which has been used for loads of from 150 to 1,000 lb. of coal per hour. The " multijet " burner is a later modification of the " grid " burner, giving a more intense flame. It is being used commercially in melting furnaces and is being developed for use in Lancashire boilers.

Carbonisation of Coal

The Fuel Research Station is equipped with three types of retorts (a) narrow vertical retorts constructed of firebrick or silica and designed at the Station for the production of free-burning smokeless fuel by carbonising at comparatively low temperatures; (b) horizontal gas retorts recently in use for determining the effect of introducing steam during the last hour or two of the carbonisation; (c) vertical chamber ovens now being used for an investigation on carbonising blends of caking and non-caking coals, or of coal and coke breeze, both at high and medium temperatures. The different types of coke produced by these retorts are on view, together with models of some of the special appartus used during the various investigations. The differences in the tars produced by different methods of carbonising are also shown.

Hydrogenation-Cracking of Tar

Hydrogenation-cracking is a process by which tars and oils may be converted into lower-boiling products, mainly hydrocarbon in nature, by treatment with hydrogen under high pressures at elevated temperatures. By suitably adjusting the temperature, pressure and other variable factors, it is possible to manufacture motor spirit or fuel oil or any proportion of the two. In order to obtain good yields of motor spirit or fuel oil, however, it is necessary to employ a catalyst or accelerator. A suitable catalyst is molybdenum sulphide, which is conveniently, but not necessarily, carried on a porous support such as alumina gel.

The " animated diagram " which forms one of the features of this exhibit by the Fuel Research Station, illustrates an experimental semi-technical scale plant which has recently been erected at the Station as a result of a series of experiments in laboratory scale apparatus. The accompanying explanatory diagram illustrates the methods of supplying heat to the converter. The plant, which is capable of treating 300 gal. of tar per day, has been designed to study the hydrogenation-cracking process on a scale sufficiently large to indicate possible results in commercial practice. By one treatment at 480°C. and 200 atmospheres pressure, 100 gal. of low-temperature tar yield 108 gal. of oil, of which 55 are spirit boiling below 200° C. The oil boiling above 200° C. may be used directly as a fuel oil or may be recycled to produce fore spirit; by complete conversion, 100 gal. of tar yield 101 gal. of motor spirit.

Some of the appliances used in conection with this high pressure plant are also shown. Among these may be mentioned a float-operated valve for automatically controlling the discharge of liquid from a high pressure vessel so as to maintain a constant liquid level inside the vessel; a high pressure liquid level gauge of the double glass type, which, while giving good vision, allows a long gauge, comparatively light in weight, to be made; and a self-filling U-gauge or seal.

Copper Stitching in Belting Leather

When belting joints or double belts are stitched with copper, the free fatty acids in the grease in the leather corrode the copper, and the copper soaps which are formed catalyse the oxidation of the oxidisable oils in the leather. The copper stitched leather in the exhibit shows the formation of green corrosion products and the exudation of the oxidised oil as a resinous mass. In very severe cases, the copper stitches may be broken by extensive corrosion. The use of anti-oxidants will not overcome the catalytic action of the large amounts of copper soaps which are formed on the surfaces of the stitches.

The work of the British Leather Manufacturers' Research Association, however, has contributed to showing that copper can be replaced by metals which are not attacked by fatty acids or alternatively that cements and glues which are now available give joints so strong that stitching is unnecessary.

Rubber in Chemical Engineering

The exhibit of the Research Association of British Rubber manufacturers demonstrates the varied properties of rubber in relation to its many technical applications, as illustrated by the data contained in " Rubber, Physical and Chemical Properties," recently published by the Association. The great increase in the utility of rubber made possible by the latest compounding and vulcanising technique is illustrated. The vulcanised products shown include not only various types of soft rubber, but also hard rubber (ebonite) and sponge rubber. The application of these products in chemical engineering is also displayed. The exhibit shows the resistance of rubber to all kinds of chemicals, its resistance to absorption and to penetration by gases and liquids, its thermal, optical and mechanical properties. In particular, specimens of transparent rubber are shown. Various recent developments are indicated, such as direct application of rubber latex, the use of various chemical derivatives and of synthetic rubber-like materials, which demonstrate the direct application of chemical technology in the rubber industry.

Corrosion Resisting Alloys

A joint exhibit by the British Non-Ferrous Metals Research Association and the Chemical Research Laboratory is designed to show the theoretical considerations underlying the development of materials for resistance to corrosion. Special reference is made to the application of these principles in practice.

Corrosion resistance depends upon the formation of a protective layer between the metal and the attacking medium, the simplest case being that of oxide films. The effect of oxide film formation in delaying the atmospheric corrosion and tarnishing of copper and iron is illustrated by specimens, treated and untreated, after exposure to the atmosphere. For instance, it is shown that aluminium and chromium which have a high affinity for oxygen owe their resistance to oxidation to their capacity for forming protective oxide films, and that these elements have proved most effective in practice in the development of oxidation and corrosion-resisting alloys. A number of alloys, owing their improved corrosion resistance to aluminium and chromium additions, are exhibited, and the effect of chromium in preventing the " fogging " of nickel is illustrated.

Illustrations are given of how metals may resist specific corrosive influences by the formation of a continuous layer of insoluble corrosion products and some examples are given of protective processes depending on this principle. Corrosion may also be prevented by the addition of an inhibitor to the corrosive medium. The results of recent work at the Chemical Research Laboratory on the inhibition of corrosion of magnesium by " ethyl " fuels by the addition of an inhibitor are illustrated.

Although the requirements for a corrosion resisting material are known, the development of suitable alloys still entails a considerable amount of empirical work. Laboratory tests, followed by service trials, must be made, and due regard has to be paid to the mechanical properties and methods of manufacture of corrosion resisting materials. Laboratory methods used in the development of aluminium brass for service as condenser tubes are illustrated, including the method used for determining the film-forming capacity of materials under corrosive conditions by the measurement of film potential. Various types of attack encountered in service are illustrated by tubes which have failed in service, and laboratory tests designed to reproduce the different types of attack are described. The effect of pre-treatment in increasing the resistance of condenser tube materials is a feature of this exhibit.

Treatment of Water

Another joint exhibit, by the Chemical Research Laboratory and the Water Pollution Research Board, shows that suitably treated British clays have valuable base-exchange properties for the treatment of water. An example is Fullers' earth, samples of which are shown, as excavated, after hydrochloric acid treatment, after baking and after silicate-aluminate treatment. Small scale softening of water is exhibited, and the resistance of the material to mechanical breakdown is also illustrated.

Many polyphenolic substances when condensed with formaldehyde can yield hard, infusible, synthetic resins which possess basic-exchange properties. The stages of the preparation are illustrated by samples showing starting materials, method of condensation, resin after baking, grinding and grading, and small-scale softening of water by quebracho tannin resin is exhibited.

Condensation products of formaldehyde with many polyphenolic substances, after generation with hydrochloric acid, can remove *bases* (*e.g.*, calcium) from aqueous solution and produce acidic effluents. Since condensation products of formaldehyde with some aromatic bases can remove *acids* from solution a combination of the two classes of resin can be used to remove dissolved solids from water. This is illustrated on a small scale.

Purification of Waste Water

Panoramic photographs show two experimental plants erected at a factory for experiments on a large scale for the Water Pollution Research Board. These plants have been in continuous operation since July, 1935. In the one plant the activated sludge process is employed. In the other plant, the wastes, after sedimentation, are passed through two percolating filters in series. The order in which the filters are used is changed at intervals of two or three weeks to prevent clogging of the filters by deposited solid matter.

A special exhibit of high pressure autoclaves from the Chemical Research Laboratory includes an early example of an autoclave and two others of more recent construction. The first autoclave, which has a full capacity of 1 litre, was made during the war from an armour-piercing shell, and is fitted with safety valve, pressure gauge and thermometer pocket. It was used at temperatures up to 300° C. under pressures up to 100 atmospheres. The other autoclaves, of one and four litres full capacity respectively, are both of modern design and are fitted with stirrers involving the use of glands sealed with oil under balanced pressure, a section of such gland is on view. One of them has been dismantled in order to show the construction of the various parts. Valves and joints employed in laboratory high pressure apparatus are also exhibited, together with a high pressure " Rotameter " which measures gas flow under pressures up to 200 atmospheres.

Extraction by Organic Solvents

A small laboratory apparatus, devised at the Chemical Research Laboratory, for extraction by organic solvents of water-soluble products has now been successfully used with ether as solvent. The solvent, in comparatively small working models, identical in every room, can be operated in steam and passes upwards to the condensers from which it flows into the upper end of the inner tube. Passing down this tube which maintains a uniform " head " of liquid, the solvent emerges through a series of nozzles and passes in fine streams upwards through the liquid thereby extracting the organic material. Returning to the boiler, the solvent is again evaporated and the cycle of operations repeated, the final result being that the desired product is concentrated in the boiler from which it may be removed at the end of the operation. The apparatus is open to the atmosphere so that there is no danger of the development of pressure and with efficient condensers there is no loss of solvent.

Recently, this type of plant has been expanded to an industrial unit of 500 gallons capacity, and this large-scale extractor is now used at the Chemical Research Laboratory for the isolation of important intermediates in dyestuff manufacture such as *m*-ethylaminophenol and resorcinol.

Effect of Paint on Illumination

The manner in which the illumination of interiors is affected by the colour and texture of paints is demonstrated by an exhibit of the Research Association of British Paint, Colour and Varnish Manufacturers, which consists of six rooms decorated in different colours. In each room the candle-power of the lamps used is the same and the general illumination at a height corresponding to a bench level of three feet is indicated by a photo-electric cell and microammeter. Some working models, identical in every room, can be operated in order to indicate how the appreciation of movement is affected by the quality of illumination, which in turn depends upon the type of paint.

SALES of zinc oxide by producers in the United States amounted to 99,697 short tons valued at $10,237,953 in 1935 compared with 87,088 tons valued at $9,851,421 in 1934, representing increases of 14 per cent. in quantity and 4 per cent. in value. Sales of leaded zinc oxide amounted to 29,976 tons valued at $2,791,808 compared with 20,506 tons valued at $2,018, 935 in 1934, representing increases of 46 per cent. in quantity and 38 per cent. in value. The volume of sales of zinc oxide was the largest since 1930 and that of leaded zinc oxide was the largest since 1925. Imports of zinc oxide (dry) for consumption in the United States in 1935 totalled 1,931 short tons and of zinc oxide in oil 59 tons, compared with 1,204 and 64 tons respectively in 1934. Exports of zinc oxide were 1,140 short tons in 1935, compared with 1,155 tons in 1934.

Letters to the Editor

The Poisons Board

SIR,—It is a pleasure to acknowledge the disclaimer of your correspondent who signs himself " Consultant," regarding the implication concerning the qualifications required for membership of the British Association of Chemists which his previous letter seemed to suggest. I did not, however, read his letter hastily, and I still think that unintentionally his letter might be interpreted at least *prima facie* in the manner suggested.

As the argument develops it appears that there is much less difference between your correspondent's views and those of the B.A.C. than he might think. In the last resort it is the difference between theory and practice. There is complete agreement about the ultimate aim, which is registration and regulation of qualifications for entry into the profession of chemistry. In his fifth paragraph your correspondent particularly asks, " How is the sufficiency of the scientific training to be determined?" The difference between us is that he answers it quite simply—the Diploma of Fellowship or Associateship of the Institute of Chemistry.

A concrete illustration is the best method of making the point clear. Let it be assumed that legislation is being contemplated with the ultimate view of closing the profession of chemistry. An applicant holds a general B.Sc., or a degree in technical chemistry not recognised by the Institute as exempting from their examination, or the diploma of the Institution of Chemical Engineers or a generally recognised diploma in chemistry of a foreign university with evidence of competent practice in chemistry. Does your correspondent seriously suggest that such applicants ought to be regarded as having entered the profession by the back door and that they are charlatans and quacks? I submit that that is the logical conclusion of his argument. Once having initiated a scheme of registration then it should be possible to raise the standard; it is impracticable to do so at first.

Your correspondent asks if I have ever heard of a member of the B.A.C. who was unable to pass the examination of the Institute. That question is best answered by asking another. Does " Consultant " suppose that the application form requires the applicant to state in what examinations he has failed? Has he ever heard of a society, chemical or otherwise, which asked such a question, and does he suppose that if it did, that question would be answered? In application for admission into professional societies, as in life, those who stress their failure rather than their success are fools who deserve to fail; and the B.A.C. judges an applicant, as any practical person judges, upon the qualifications which the candidate actually holds. Having laid it down that the diploma of the Institute is not the only qualification the B.A.C. will recognise, it could not ask such a question even if it wished to do so.

There is one point upon which I think your correspondent can set his mind at rest. Evidence regarding the practice of pure or applied chemistry is very carefully reviewed by the nominations committee, and it would not accept the testimony of superiors whom the applicant had impressed with his charm as adequate. I cannot help thinking that your correspondent has rather exaggerated the danger of evidence of this kind. It may occasionally happen that superiors are impressed by charm of manner rather than by evidence of competency in the vocation professed, but it is not our experience that it occurs very often. Apart from this, those who testify as to the ability to practice must themselves be competent to form a judgment.

Your correspondent does not seem to understand that the principal function of *all* trade unions is to ensure the competency of their members. Every other activity clearly depends upon this. " The protection of chemists' benefits of one kind or another " cannot be secured or maintained if it is not first understood that those who claim privileges must show evidence of right to them. Surely your correspondent does not hold the old-fashioned and entirely discredited view that the function of a trade union is to extract as much as possible for as little service as possible?

" Consultant's " appeal to the position of the profession of medicine and dentistry is not a fortunate one from his point of view. In the first place the original medical Act provided for the inclusion of practitioners who did not hold a recognised diploma. The dental Act did exactly the same thing. There are, in fact, now practising a number of registered dentists who do not hold a dentist's diploma. The distinction is that a dentist who has not a diploma in dental surgery may not describe himself as a dental surgeon or surgeon dentist.

I hope and believe that these observations cover the various interesting points raised by " Consultant," and if he will consider them I think he will realise that the problem is more complex than he supposes. A final word might be added regarding the question of a scheme of registration for which the B.A.C. stands and indeed is pledged to bring about. Clearly it cannot be done on the basis of the qualifications of the Institute of Chemistry alone unless the Institute is itself prepared to consider the whole question of qualifications from the widest possible point of view. We do not doubt that the Institute has the interests of the profession at heart, and we feel that it could not give better expression to that interest than to consider the question at the earliest possible moment.
—Yours faithfully,

HENRY T. F. RHODES,
Editor, " The Chemical Practitioner."

Dyeing Industry Rationalisation

Scheme to Eliminate Redundant Capacity

A SCHEME for dealing with surplus capacity and adoption of a compensatory pool in the cotton and rayon piece-goods dyeing industry has been circulated to all firms in the trade. The proposals were first discussed a year ago, but since then amendments to the scheme have been made. Support to the proposals has been obtained from the leading organisations, including the Bradford Dyers' Association, Calico Printers' Association, Bleachers' Association and United Turkey Red Co. Under the scheme it is hoped to eliminate between 25 and 30 per cent. of the present capacity of the industry, which is the percentage considered redundant.

The cost of buying redundant machinery is estimated to be £1,500,000, which will be repaid over a period of 15 years by means of a levy, not exceeding 4 per cent. on turnover. It is estimated that the firms concerned will be able to pay the levy without any increased dyeing charge to the trade.

The proposals provide for a board to be set up consisting of independent persons and members who will deal with technical matters. It is hoped that the effect of the greater concentration which will be brought about by the operation of the scheme will be to lower production costs and secure greater economical working, and thus put the industry in a more advantageous competitive position in world trade.

MANUFACTURERS of colouring materials in Switzerland had a difficult time in 1935, not only in encountering high tariffs and import prohibitions, but also in meeting the increasing competition of new factories developed abroad. They managed, nevertheless, to maintain and even slightly surpass the value of 1934 exports. Sales abroad of chemical products for industrial uses, however, declined almost 18 per cent.

International Congress on Glass

Meetings in London and Sheffield

THE official opening ceremony of the Second International Congress on Glass will be performed by the Duke of Kent at 11 a.m. on July 2 at the Institution of Electrical Engineers, Savoy Place, London. Technical sessions and social functions have been arranged for the period July 2 to 11. Apart from July 5 to 8 when the congress meets at the Department of Applied Science, at Sheffield University, the headquarters will be at the Institution of Electrical Engineers, London.

Overseas delegates will have an opportunity of visiting a number of glass works in the country and all members of the congress are invited to inspect the steel works of Steel, Peech and Tozer, Ltd., and Hadfields, Ltd. Dr. A. Seeling, president of the Deutsche Glastechnische Gesellschaft, and Mr. F. C. Flint, president of the American Ceramic Society, will take the chair at the general sessions on July 3 and 6. The full programme and particulars of membership are available on application to the secretary of the congress, Professor W. E. S. Turner, the University, Sheffield.

Chemical Engineering in Germany

Tenth General Meeting of the "Dechema"

THE tenth general meeting of the Dechema Deutsche Gesellschaft für chemisches Apparatewesen E.V. will take place in Munich on July 10, at the occasion of the general meeting of the Society of German Chemists.

At the morning session an announcement will be made concerning the establishment of the Max Buchner Research Foundation, and Professor Dr. Duden, of Frankfort-on-the-Main, will read a paper entitled "10 Years of the Dechema: Collaboration between Chemist and Engineer." Other papers to be read include:—"Research with Regard to the Agglomeration of Inorganic Salts" (Professor Dr. Henglein, of Carlsruhe); "Physical Basis, Problems and Present State of Development of the Theory and Science of Filtration" (Privatdozent Dr. Prockat, of Berlin); "The Extraction of Liquids and Vapours by Means of Liquids" (Professor Dr. Fuchs, of Darmstadt), and "Standardising as a Principle of Technical Thought" (Professor Dr. H. H. Franck, of Berlin). Comments will also be made about the results of the First International Congress of Chemical Engineering, which is being held in London this month. The subject for discussion at the afternoon session will be "Electric Heating in Chemical Engineering."

Boots Pure Drug Co., Ltd.

Lord Trent on Future Prospects

PRESIDING at the 48th annual meeting of Boots Pure Drug Co., Ltd., at Nottingham on June 11, Lord Trent announced that the company's past records had been easily beaten. Progress with the centralisation and extension of the company's various Nottingham manufacturing units at Beeston continued according to plan. The severe frost caused a slowing down in the erection of the new block of buildings, but since the weather improved the work had gone ahead, and they hoped to move into the first section during the summer. Here would be housed the dry products manufacture and distribution, while a smaller section would be devoted to fine chemicals. In the fine chemical department they had had to contemplate a considerable extension both of factory accommodation and plant. They had not only to meet a great and rapidly increasing demand for special medical products; they had also to provide for the manufacture of an extending range of fine chemicals, for they had continually in mind the importance of making this country independent of foreign supplies.

The five-day week was now established as a permanent institution in their Nottingham factories, and they took pride in the fact that they had provided an example likely to have an important influence on the industrial life of this country. The provision of more leisure was the inevitable corollary of mechanical efficiency and large-scale production.

Speaking of the general situation, Lord Trent said under present conditions he would be a foolish man who would forecast business conditions for twelve months ahead. If the purchasing power was in the pockets of the public, there was no question as to the excellent prospects of the company. But with the nations equipping themselves less and less for the productive pursuits of peace, and more and more for aggression on the one hand, and self-defence on the other, the world seemed to be organising for sterility, rather than for stability. Money spent on armament programmes created an illusion of prosperity in certain sections of the population, but such expenditure was, by its nature, largely unproductive, and sooner or later had to be paid for in a diminution of purchasing power, which reacted upon the world as a whole. Here in this country, after emerging a long way from the world depression, we had been compelled by external pressure to embark on a rearmament programme. We could probably afford this unavoidable expenditure better than almost any other nation, but it was a programme of waste, and did not make for healthy economic conditions. So far as the company was concerned, therefore, they felt it essential to keep ample funds in hand, so that they might be prepared for any eventuality.

New Oil from Coal Plant

Opening Ceremony at Erith

A NEW £80,000 coal distillation plant, which the National Coke and Oil Co., has erected at Erith, Kent, was opened by Sir Robert Horne on Wednesday. Sir Robert said the new enterprise was going to bring employment to a large number of people in the coalfields. Coal was the only indigenous asset Great Britain had. Without it the country would be utterly bankrupt, for everything was dependent on our coal trade. In the past coal had been used most wastefully. Many of its by-products had gone out of the chimneys in smoke. Such schemes as this were doing much to prevent the waste. Not only was the production of oil and petrol from coal useful for the national defence, but it would provide a defence of the coalfields, and help to preserve the livelihood of the collier.

Mr. Arnold Rowntree, a director, said the company had a similar works at Tipton. The two plants together would use 300 tons of coal a day and put into employment 300 miners. He saw no more likely way to help the depressed areas and especially the miners than by the development of such an industry.

It is understood that the company proposes to erect similar plants at Edinburgh, Manchester, Glasgow and Cardiff. From every ton of coal used the company obtains from 12 to 15 gal. of petrol, 20 gal. of diesel oil, and 15 cwt. of smokeless fuel. Already 17 petrol stations in the London area are supplying the company's petrol.

Contracts Placed for Bolsover Plant

Contracts to the value of £150,000 have been placed by Low Temperature Carbonisation, Ltd., for new plant to be erected at Bolsover in connection with the conversion of 6,000,000 tons of coal into oil fuel and petrol. The successful contractors are Simon-Carves, Ltd., Babcock and Wilcox, Ltd., Naylor Brothers, Ltd., Davy Brothers, Ltd., Qualter Hall and Co., Ltd., E. J. and J. Pearson, Ltd., and the Horsehay Co., Ltd.

The foundations for the first 72 retorts have already been completed, the site has been prepared, and arrangements for the sidings have been completed with the L.M.S. railway company. The official opening will probably take place in November, and the plant will give direct employment to 1,000 men.

British Overseas Chemical Trade in May

According to the Board of Trade returns for the month ended May 31, 1936, exports of chemicals, drugs, dyes and colours were valued at £1,811,896, as compared with £1,860,846 for the corresponding month of 1935, showing a decrease of £48,950. Imports were valued at £956,981, against £891,580, an increase of £65,401, while re-exports were valued at £32,313, against £34,333, a decrease of £2,020.

Imports

	Quantities. 1935.	Quantities. 1936.	Value. 1935.	Value. 1936.
Acids—				
Acetic .. .. cwt.	14,662	13,955	21,437	17,344
Boric (boracic) ,,	4,620	4,722	4,584	4,729
Citric .. .. ,,	1,255	2,536	5,102	10,267
Tartaric .. ,,	3,552	4,080	14,948	19,055
All other sorts value	—	—	7,504	6,204
Borax .. .. cwt.	14,603	19,825	7,302	11,267
Calcium Carbide .. ,,	92,019	88,708	47,467	46,837
Fertilisers, manufactured, not elsewhere specified—				
Superphosphate of lime .. .. tons	2,743	1,708	5,535	3,332
All other descriptions ,,	737	888	4,095	6,821
Phosphorus .. cwt.	1,122	49	3,165	228
Potassium compounds—				
Caustic and lyes ,,	10,346	11,638	12,820	12,751
Chloride (muriate) ,,	21,412	40,202	6,373	13,311
Kainite and other mineral fertiliser salts cwt.	50,801	48,340	7,205	7,256
Nitrate (saltpetre) ,,	9,410	25,044	5,738	9,674
Sulphate .. ,,	40,868	10,840	14,377	4,892
All other compounds ,,	10,815	8,255	16,471	11,314
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	6,450	1,042	2,123	441
Chromate and bichromate .. .. cwt.	6,346	1,003	8,405	1,209
Cyanide .. ,,	4,358	4,201	11,929	8,395
Nitrate .. .. ,,	66,186	37,000	14,059	7,847
All other compounds ,,	19,630	25,888	15,236	20 888
Other chemical manufactures .. .. value	—	—	250 107	256,588
Drugs, medicines etc.				
Quinine and quinine salts .. oz.	134,840	194,800	10,816	14,381
Medicinal oils, cwt.	2,431	3,021	6,842	6,632
Proprietary medicines, .. value	—	—	46,151	33,773
All other sorts ,,	—	—	35,110	48,896
Dyes and dye-stuffs and extracts for tanning—				
Finished dye-stuffs (coal tar) .. .. cwt.	3,935	5,009	102,021	146,817
Extracts for dyeing ,,	5,020	4,551	9,718	7,738
Extracts for tanning (solid or liquid)—				
Chestnut .. cwt.	28,840	23,887	19,355	15,686
Quebracho .. ,,	17,571	9,937	10,080	8,477
All other sorts ,,	28,853	74,185	20,399	55,059
All other dyes and dye-stuffs .. .. cwt.	911	639	19,640	15,538
Painters' colours and materials—				
White lead (basic carbonate) .. cwt.	11,033	8,094	13,146	10,353
Lithopone .. ,,	22,242	27,630	14,320	17,304
Ochres and earth colours cwt.	29,114	43,623	10,718	12,771
Bronze powders ,,	1,973	3,090	13,268	12,018
Carbon blacks .. ,,	23,425	22,601	37,729	33,796
Other pigments and extenders .. cwt.	20,552	32,251	6,371	8,414
All other descriptions cwt.	15,384	12,667	29,914	28,678
Total .. .. value	—	—	891,580	956,981

Exports

	Quantities. 1935.	Quantities. 1936.	Value. 1935.	Value. 1936.
Acids—				
Citric .. .. cwt.	2,257	3,874	9,030	16,418
All other sorts .. value	—	—	24,754	24,156
Aluminium compounds tons	8,850	2,599	100,835	21,375
Ammonium compounds—				
Sulphate tons	18,905	19,761	111,152	114,434
All other sorts .. ,,	1,276	1,331	15,925	14,076
Bleaching powder (chloride of lime) .. cwt.	28,670	47,594	10,947	12,244
Coal tar products—				
Cresylic acid .. gal.	156,336	197,978	13,608	22,498
Tar oil, creosote oil, etc. .. .. gal.	1,335,693	4,271,899	37,065	106,921
All other sorts .. value	—	—	18,250	20,124
Copper, sulphate of tons	4,865	2,893	65,923	40,454
Disinfectants, insecticides cwt.	36,625	29,722	71,315	61,191
Fertilisers, manufactured tons	8,440	7,617	38,184	31,017
Glycerine .. .. cwt.	8,357	10,680	21,534	27,176
Lead compounds .. ,,	17,864	12 980	19 619	16,872
Magnesium compounds tons	550	419	12,588	10,737
Potassium Compounds cwt.	14,008	4,359	15,310	9,330
Salt (sodium chloride) tons	23,854	23,707	52,997	57,784
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	335,139	352,417	82,221	76,036
Caustic .. .. cwt.	187,284	168,204	96,387	87,418
Nitrate .. .. ,,	11,783	10,124	4,240	7,848
Sulphate, including salt-cake .. .. cwt.	79,250	65,613	7,009	5,921
All other sorts .. ,,	76,005	62,460	96,031	76,235
Zinc oxide .. tons	1,014	1,207	18,802	22,377
All other descriptions value	—	—	233.459	239.495
Drugs and medicinal preparations—				
Quinine and quinine salts oz.	145,401	102,199	15,286	11,912
Proprietary medicines value	—	—	93.754	91,691
All other descriptions ,,	—	—	138,488	135,430
Dyes and dye-stuffs for tanning—				
Finished dye-stuffs (coal tar)—				
Alizarine, alizarine red and indigo (synthetic) .. cwt.	1,930	1,720	11,444	11,862
Other sorts .. ,,	6,977	7,078	92,548	95,366
All other descriptions cwt.	25,139	22,119	29,729	27,877
Painters' colours and materials—				
Ochres and earth colours cwt.	20,987	22,981	16,414	17,215
Other descriptions ,,	24,333	32,668	32,235	39,486
White lead .. ,,	6,687	4,632	12,547	9,564
Paints and painters' enamels, ready-mixed cwt.	41,578	43,005	111,715	118,216
Varnish and lacquer (clear) coloured or not gal.	93,314	71,392	33,761	28,630
Printers' ink .. cwt.	4,621	5,068	28,431	24,206
All other descriptions cwt.	33,980	37,084	67,309	78,304
Total .. .. value	—	—	1,860,846	1,811,896

Re-Exports

	Quantities. 1935.	Quantities. 1936.	Value. 1935.	Value. 1936.
Chemical manufactures and products .. value	—	—	18,256	17,141
Drugs, medicines and medicinal preparations—				
Manufactured or prepared .. value	—	—	13,550	12,010
Dyes and dye-stuffs for tanning .. cwt.	447	1,971	1,463	1,951
Painter's colours and materials .. cwt.	612	873	1,064	1,211
Total .. .. value	—	—	34,333	32,313

Personal Notes

Dr. F. W. GRAY, senior Lecturer in Chemistry at Aberdeen University, has resigned his position owing to ill-health.

Mr. WILLIAM B. CUTHBERTSON, of D. Wyllie and Co., fertiliser manufacturers, who resided at Dunalastair, Wheatfield Road, Ayr, left estate valued at £86,736.

Dr. KENNETH E. GREW has received the appointment of lecturer in the physics department of Heriot-Watt College, Edinburgh.

Mr. J. D. ATHEY, secretary of the Textile Institute, is retiring for health reasons after twenty-one years' service. A suitable testimonial to Mr. Athey is being organised in recognition of his services to the Institute.

Dr. H. B. TRUMPER, Group Labour Manager of I.C.I. Metals (Ltd.), discussed medicine's contribution to the ideal industrial community in an address on "Industrial Man" at a luncheon meeting of the Birmingham Jewellers' Association at the Imperial Hotel on Monday.

Dr. W. F. GEDDES, chemist in charge of the Government Grain Research Laboratory at Winnipeg, and secretary to the Associated Grain Research Council, which co-ordinates the work of the various cereal laboratories in Canada, paid a visit to the Scottish C.W.S. Regent Flour Mills, Glasgow, when he arrived in the city last week from Canada.

Mr. JOHN DUNDAS, of George Scott and Son (London), Ltd. and Ernest Scott and Co., Ltd., has died suddenly. Since 1915 Mr. Dundas had rendered incalculable service and guidance as chairman of the companies. He is succeeded by Mr. Alexander McLean Ewing, who has for a number of years been a director. Mr. Ewing has wide interests, being a director of George Outram and Co., Ltd., vice-chairman of the Press Association, vice-chairman of Reuters, and director of a number of other companies. The vacancy on the board has been filled by the appointment of Mr. George William Riley, who has for many years been chief of the technical staff. He is a well-known authority on exaporation, distillation, drying, etc., and has been responsible for a number of the patent plants and processes which are being developed by the Scott companies.

Mr. L. A. K. STAVELEY, an old boy of Stamford School, has been appointed assistant tutor in chemistry at Trinity College, Oxford, of which he is at present a scholar.

Miss MARGARET AUGUSTA LEISHMAN, fellow and tutor in science, St. Hugh's, Oxford University, has been elected to a Gamble Lectureship in Chemistry, 1936-7.

Mr. WILLIAM GRUBB, B.Sc., who graduated at Glasgow University last year with first-class honours in chemistry, has been appointed Assistant Scientific Officer in the Air Establishment at Farnborough.

Mr. HASSLACHER, Germany, was unanimously re-elected president of the International Conference of Benzole Producers at the annual meeting at Gleneagles last week, which was held under the chairmanship of Sir David Milne-Watson.

M. A. BARIL, of Paris, president of the International Gas Association, will attend a dinner to be given at Grosvenor House, Park Lane, on Monday, by the Institution of Gas Engineers in honour of overseas delegates of the gas industry who will attend the Chemical Engineering Congress of the World Power Conference.

Professor J. A. S. RITSON has been appointed a member of the Board for Mining Examinations in place of the late Professor J. S. Haldane. Professor Ritson was H.M. Inspector of Mines for Yorkshire in 1921-2, and in the following year was appointed Professor of Mining in Leeds University. That position he held until the end of last year, when he became Professor of Mining, Imperial College, Royal School of Mines, London University.

Mr. FRANK S. RUSSELL, chairman and managing director of General Refractories, Ltd., has just returned from an extensive continental business tour. He reports that trade conditions have improved in Greece, with a marked increase of stability as a result of the restoration of the monarchy. He formed a specially favourable opinion of prospects in Yugoslavia, an excellent agricultural country, apparently well manager an dpossessing almost every mineral in workable quantities. He arranged for the formation of a subsidiary company there.

Continental Chemical Notes

Jugoslavia

WORK IS TO BE STARTED shortly at Smederevo upon a co-operative sugar factory with a through-put of 60,000 tons sugar beet during a 100-day campaign.

SWISS INTERESTS are reported to be negotiating with a view to restarting the cellulose factory at Drvar, which has been idle for several years ("Chemische Industrie").

PERMISSION HAS BEEN GRANTED to the Aluminium Company of Belgrade to erect a factory near the Krka Falls at Sibenik where employment is expected to be found for 400 hands when production commences next spring.

Palestine

EXPLOITATION OF THE GAZA SULPHUR DEPOSITS is proceeding very slowly owing to lack of drying equipment, the daily output only amounting to 2 tons. It is intended eventually to increase production to 6,000 tons per annum.

THE POSSIBILITY of dispensing to some extent with foreign rubber (natural) and cellulose is under official consideration. A special commission has been set up to study the feasibility of large-scale rubber tree cultivation. At the recent Milan Fair a variety of articles prepared from Italian cellulose were exhibited, the raw materials used including rice straw, tobacco stalks and chestnut waste.

France

RECENT COMPANY formations include the following: Société Bourgeois et Cie, rue de Moulin-Fevon, La Courneuve (Seine) with a capital of 100,000 francs (manufacture of coloured agglomerates for traffic signals); Manufacture Française "Pectinol," 56 rue du Faubourg-Saint-Honoré, Paris, with a capital of 400,000 francs (manufacture and sale of chemicals, paints and water-sterilising equipment.

Italy

TELLURIUM-LEAD represents the main field for tellurium at the present day but several minor outlets have aroused interest (according to a writer in "Giorn. dei Chim.", April 1936, p. 130). The element and its compounds exercise a marked bactericidal action and numerous preparations on the basis of colloidal tellurium have in fact been introduced into medicine. Diethyl tellurium resembles tetraethyl lead in functioning as an anti-knock agent in petrol. Tellurium has also been examined as an ingredient of photo-sensitive preparations in conjunction with ferric chloride and tartaric acid. Under the action of light the ferric salt is reduced to the ferrous salt which in presence of hydrochloric acid reduces tellurium anhydride to form a brownish-black deposit of tellurium metal.

From Week to Week

SECTION F ON "HYGIENE OF FOOD" at the annual congress of the Royal Sanitary Institute, at Southport, during the week July 6 to 11, will be conducted by the Food Group of the Society of Chemical Industry.

OVER 250 WORKERS EMPLOYED by the British Aluminium Co., at Lochaber, Kirkcudbrightshire, stopped work on Sunday last. The men's demands for the restoration of the cuts imposed in 1932, holidays with pay and improvement in working conditions were refused by the company.

THE BRITISH SUGAR CORPORATION has been registered as a public company with a capital of £5,000,000, and Sir Francis Humphrys, a former British Ambassador in Bagdad, as chairman. The amalgamation includes fifteen beet sugar companies, and is the outcome of a stipulation made by the Government last March as a condition of the continuation of the beet sugar subsidy.

A RECORD DEMAND BY LONDON EXHIBITORS FOR SPACE in the British Industries Fair for 1937 is announced by the Department of Overseas Trade. Within one week of the issue of forms of application no fewer than 308 exhibitors had applied for 156,768 sq. ft. of exhibiting space, exclusive of applications for space in the textiles section for which forms are being issued later in the month.

A BOOKLET ENTITLED "CORROSION RESISTING PLANT for Foodstuffs and Dairy Industries, Pharmaceuticals, etc.," has just been issued by John Thompson (Dudley), Ltd., giving extensive descriptions and illustrations of their special department for dealing with all types of plant used in the manufacture of foodstuffs. Copies of the booklet may be obtained on application to the company.

COAL AND ALLIED INDUSTRIES, LTD., announce that the reconstruction necessitated by the fire at the company's plant at Seaham Harbour was completed some few weeks ago, and the first half of the carbonising battery has since been in operation and is working smoothly. The crude products and smokeless fuel are now accumulating, the former for further treatment and the latter for sale at an early date. The oil refinery and the chemical treatment plant will be put into operation before the end of this month.

SULZER BROS. (LONDON), LTD., have acquired as a going concern the business of Hathorn, Davey and Co., Ltd., Sun Foundry, Hunslet, Leeds, to enable it to manufacture in this country, with its own organisation and equipment, the products on which the Sulzer reputation has been built. A considerable sum of money is being expended on modernisation of the works, and new machinery and equipment. This arrangement will not interfere with the manufacture by Hathorn, Davey and Co., Ltd., of their own products as they will continue to maintain their separate connections.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for an increase in the import duties on barium chloride. The committee has under consideration the question whether the existing Free List heading relating to potassium products should be amended to "Potassium carbonate: potassium chloride: potassium sulphate: kainite and other potassium fertiliser salts, whether mineral or not." Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than July 6.

SHIPMENTS OF CHINA CLAY for May, though not as good as they were in April are nearly 5,000 tons above those recorded for the corresponding month in 1935, whilst the first half of the present year promises to be substantially over the similar period last year. Shipments made in May were: Fowey, 38,979 tons of china clay; 1,371 tons of china stone; 2,065 tons of ball clay. Charlestown, 5,059 tons of china clay; 829 tons of china stone; Par, 13,842 tons of china clay; 1,822 tons of china stone; 20 tons of ball clay; Padstow, 1,209 tons of china clay; Looe, 183 tons of china clay; Plymouth, 135 tons of china clay; Newham, 31 tons of china clay; Rail, 5,514 tons of china clay; making an aggregate of 64,952 tons of china clay; 4,022 tons of china stone; 2,085 tons of ball clay; or a total tonnage of 71,059 tons compared with 66,696 tons in May, 1935.

THE GOVERNORS of Heriot-Watt College, Edinburgh, announced on June 12 that the agreed sum of £1,000 has been received from the Royal Public Dispensary for pharmacy teaching. The memorial to the late Professor Briggs was unveiled on June 6, and the balance of the memorial funds had been handed over to the College trustees to be used for a prize to be known as the Briggs Prize, providing for two yearly awards of £4 10s. each. Reference was also made to the delay in the plans for the furnishings of the physics and chemistry laboratories and the fume extraction plant. It is hoped that part of the extension will be ready for occupation in September. Tenders have been accepted for laboratory furnishings and fittings amounting to £5,402, and for fume extraction plant for the chemistry laboratories amounting to £1,373.

THE NOMINAL CAPITAL of the Anchor Chemical Co., Ltd., Clayton Lane, Clayton, Manchester, has been increased by the addition of £50,000 in £1 ordinary shares beyond the registered capital of £100,000.

J. G. JACKSON AND CROCKATT, LTD., mechanical and chemical engineers, Glasgow, have appointed Edward G. Herbert, Ltd., Atlas Works, Levenshulme, Manchester, to be their agents in Lancashire, Yorkshire, Cheshire and Derbyshire.

THE NATIONAL FEDERATION OF ASSOCIATED Paint, Colour and Varnish Manufacturers of the United Kingdom, held their sixteenth summer conference this week at the Royal Hotel, Scarborough. Mr. J. A. Dew, the president, and Mrs. Dew were the host and hostess, and about 125 delegates attended the conference which closed on Friday.

A SURVEY OF THE IMPORT TRADE OF INDIA for the fiscal year, April 1, 1935, to March 31, 1936, prepared by His Majesty's Senior Trade Commissioner in India, including an extract from the Ceylon Administration Report for 1935 (Customs and Shipping) has been published by the Department of Overseas Trade, 35 Old Queen Street, London.

THE EXHIBIT OF IMPERIAL CHEMICAL INDUSTRIES, LTD., at the Royal Agricultural Show at Bristol, from June 30 to July 4 will deal with grass management in all its forms, including grass drying and feeding and also ordinary silage making. The mechanical drying of grass will be shown by an 8 ft. model of the Billingham grass drier. The use of "Chloros" and pest control products will also be illustrated.

A SPECIAL GENERAL MEETING of the members of the North of England Institute of Mining and Mechanical Engineers, to pass new by-laws, will be held in the lecture theatre of the Institute, Newcastle-upon-Tyne, at 2.25 p.m. to-day, June 20. At the ordinary general meeting at 2.30 p.m. the papers for discussion include one on "Accident Risks and Repairs," by Capt. S. Walton-Brown.

A VERDICT of "Accidental death" was returned at an inquest at Leeds on Tuesday on Wilfred Townend (49), metal hardener, who died on Monday from extensive burns after being caught by molten cyanide which "blew out" from a furnace at the engineering works of John Fowler and Co. (Leeds), Ltd., Hunslet. The jury added a rider that they thought precautions should be taken to see that the man working the furnace knew that it was not too full.

THE ITALIANS, it is reported from Rome, have just located at Jubdo, south-west of Addis Ababa, what they describe as "the richest platinum mine in Africa." The mine has been worked by primitive means by a French company since 1924. The platinum output of the mine is stated to be of high purity, reaching 60 or 70 per cent., and to compare favourably with the ratio in the South African mines. The mine was worked on a reduced scale throughout the war. The output before the war was, it is stated, about 55 lb. of platinum a month.

NEMLIN CHEMICALS, LTD., chemical manufacturers and distillers, of Bradley Fold, near Bury, Lancashire, have taken over from the Bury Corporation the tar distillery in Proctor Street, Eldon, and have entered into an agreement with the gas department to take over their output of tar for a long period. Alterations and extensions of the building are now going forward and other steps are being taken towards the installation, at a cost of many thousands of pounds, of a modern up-to-date tar and oil distilling plant, in addition to that which is being transferred from Bradley Fold. The principal manufacture will be that of road materials, but there will also be the production of bitumens, paints and varnishes.

Forthcoming Events

LONDON

June 22 to 27.—Chemical Engineering Congress of the World Power Conference and British Chemical Plant Exhibition. For full programme see pages 553-555.

June 22.—Institution of Gas Engineers. Dinner in honour of overseas delegates of the gas industry attending the Chemical Engineering Congress. Grosvenor House, Park Lane.

June 23.—Institution of Chemical Engineers. Annual Dinner. 7 p.m. Hotel Victoria, Northumberland Avenue, London, W.C.2.

June 25.—Mineralogical Society. 5.30 p.m. Geological Society of London, Burlington House, Piccadilly.

NEWCASTLE-ON-TYNE.

June 20.—North of England Institute of Mining and Mechanical Engineers. 2.25 p.m. Lecture Theatre, Newcastle-on-Tyne.

Chemical and Allied Stocks and Shares

CONDITIONS in most sections of the Stock Exchange have not shown any appreciable change this week. Shares of chemical and kindred companies were very steady. B. Laporte moved in favour of holders, largely owing to a more general realisation of the high earning capacity of the business. Imperial Chemical have been steady. The general belief in the market is that on present indications an increased dividend for the current year is unlikely in view of the uncertainties attaching to international trade, as the directors have indicated that until there is a real change for the better in overseas business a conservative dividend policy is to be followed. Nevertheless, on the basis of last year's 8 per cent. dividend the yield offered is still apparently very good for a leading industrial share, and there are anticipations in the market that when effect is given to the scheme for merging the deferred shares into ordinary shares, the latter may come in for increasing attention. Salt Union retained the better tendency which developed recently. Fison, Packard and Prentice are unchanged at the time of writing. British Oxygen were again in larger demand on favourable views of prospects; it is being pointed out in the market that there is likely to be expansion of the company's business in the Dominions as well as at home. Imperial Smelting were under the influence of the lower price of zinc, but hopes persist in the market that dividends may be resumed this year with a payment of possibly 5 per cent. Distillers were good on estimates that the dividend for the past year is likely to be raised from 20 per cent. to 22½ per cent. and United Molasses have been done at better prices. The two companies have an agreement in respect of industrial alcohol activities and they have a shareholding in each other. Boots Pure Drug were steady, aided by the statements at the recent annual meeting with regard to the possibility of extension of business to other Dominions if the company's retail stores in New Zealand prove successful. William Blythe 3s. shares were rather more active, judging from the "markings" of business, and are around 6s. 4½d. British Drug Houses were again steady and unchanged. British Cyanides were rather dull. Fison, Packard and Prentice were unchanged and again not very active, but very few sellers were reported. The shares continue to be held firmly, no doubt on the belief that fuller benefits will accrue this year from the company's extended activities, and that consequently a larger dividend may be in prospect. Courtaulds were prominent at one time but reacted later and show little change on balance. The market is not bugeting for an increase in the interim dividend, due next month, but the disposition in the market is to take the view that when the company's scheme of works additions and extensions is completed there is likely to be a large expansion in profits, granted satisfactory general trade conditions. Triplex Safety Glass continued in good demand on increased dividend and bonus possibilities. The lower prices announced by the company to motor car manufacturers is in accordance with the declared policy of the directors to lower prices with a view to extending the use of the company's product. The recently-issued shares of Greeff Chemicals Holdings were firm. The 5s. ordinary are 9s. at the time of writing, and the 5½ per cent. 10s. preference 10s. 9d. The prospectus showed that the average profits for the past three years would be sufficient to cover the preference dividend over 3¾ times and leave a balance equivalent to nearly 16 per cent. on the ordinary shares, after allowing for the preference dividend. Unilever were less active, partley because now there are reduced fears of a devaluation of the French and Dutch currencies, there is less demand for internationally-dealt-in shares as an investment in sterling. Staveley Coal and Iron were active on the hopes of a larger dividend, but best prices were not held. Pinchin, Johnson found buyers on hopes of a possible bonus later on and anticipations that a larger dividend for the year is likely. Lewis Berger were firm. Consett Iron remained in demand at higher prices and there was strong buying of Dorman Long on the estimates current in some quarters that a dividend of 10 per cent. may be forthcoming for the year. It is generally realised that profits are likely to show a further good advance for the current year, in which case earnings on the ordinary shares would be at a good rate, but the question of dividend depends a good deal on the view the directors take as to the proportion of the profits to be set aside for any future scheme for reducing debenture interest and other changes. Oil shares were more active.

Name.	June 16.	June 9.
Anglo-Iranian Oil Co., Ltd. Ord.	80/7½	85/7½
Associated Dyers and Cleaners, Ltd. Ord.	1/9	1/9
Associated Portland Cement Manufacturers, Ltd. Ord.	91/10½	87/6
,, 5½% Cum. Pref.	28/-	28/9
Benzol & By-Products, Ltd. 6% Cum. Part Pref.	5/-	5/-
Berger (Lewis) & Sons, Ltd. Ord.	68/1½	68/9
Bleachers' Association, Ltd. Ord.	5/-	5/-
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	20/-	20/-
Boots Pure Drug Co., Ltd. Ord. (5/-)	53/9	53/6
Borax Consolidated, Ltd., Pfd. Ord. (£)	110/-	110/-
,, Defd. Ord.	28/1½	28/1½
,, 5½% Cum. Pref. (£10)	£11/17/6	£11/17/6
Bradford Dyers' Association, Ltd. Ord.	7/6	7/6
British Celanese, Ltd. 7% 1st Cum. Pfd.	23/3	23/3
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/6	5/9
British Cyanides Co., Ltd., Ord. (2/-)	3/6	3/6
British Drug Houses, Ltd. Ord.	20/-	20/-
,, 5% Cum. Pref.	22/6	22/6
British Glues and Chemicals, Ltd. Ord. (4/-)	8/6	8/6
,, 8% Pref. (Cum. and Part.)	30/-	30/-
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	48/9	48/9
British Oxygen Co., Ltd. Ord.	102/6	95/-
,, 6½% Cum. Pref.	34/4½	34/4½
British Portland Cement Manufacturers, Ltd. Ord.	96/3	93/9
Bryant & May, Ltd. Pref.	67/6	67/6
Burt, Boulton & Haywood, Ltd. Ord.	21/3	21/3
,, 7% Cum. Pref.	28/1½	28/9
,, 6% 1st Mort Deb. Red. (£100)	£101/10/-	£101/10/-
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	110/-	108/9
,, 4% 1st Mort. Deb. Red. (£100)	£94/10/-	£94/10/-
Calico Printers' Association, Ltd. Ord.	6/10½	6/10½
Cellulose Acetate Silk Co., Ltd. Ord.	11/9	11/3
Consett Iron Co., Ltd. Ord.	11/3	10/-
Cooper, McDougall & Robertson, Ltd. Ord.	32/6	30/-
,, 7% Cum. Pref.	28/9	28/9
Courtaulds, Ltd. Ord.	51/10½	50/-
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre-Pref.	25/-	25/-
Distillers Co., Ltd. Ord.	102/-	102/-
Distillers Co., Ltd. Ord.	104/-	102/-
,, 6% Pref. Stock Cum.	31/6	31/6

Name.	June 16.	June 9.
Dorman Long & Co., Ltd. Ord.	37/6	32/6
English Velvet & Cord Dyers' Association Ltd. Ord.	3/9	3/9
Fison, Packard & Prentice, Ltd. Ord.	44/4½	44/4½
,, 7% Non-Cum. Pref.	31/3	31/3
,, 4½% Debs. (Reg.) Red. (£100)	£106	£106
Gas Light and Coke Co.	28/3	28/3
,, 4% Consolidated Pref. Stock (£100)	£106/10/-	£106/10/-
Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	12/6	12/6
,, 7% Prefd. Ord. (10/-)	13/1½	13/1½
,, 7% Cum. Pref.	28/9	28/9
Gossage, William, & Sons, Ltd. 6½% Cum. Pref.	24/4½	24/4½
Imperial Chemical Industries, Ltd. Ord.	39/-	39/-
,, Deferred (10/-)	9/7½	9/7½
,, 7% Cum. Pref.	34/10½	34/7½
Imperial Smelting Corporation, Ltd. Ord.	16/3	16/3
International Nickel Co. of Canada, Ltd.	$47	$46½
Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	105/-	105/-
Laporte, B., Ltd. Ord.	117/6	105/-
Lawes Chemical Co., Ltd. Ord. (10/-)	8/9	8/9
,, 7% Non-Cum Part Pref. (10/-)	10/-	10/-
Lever Bros., Ltd. 7% Cum. Pref.	33/6	33/6
Magadi Soda Co., Ltd. 6% 2nd Pref. (5/-)	6d.	6d.
,, 6% 1st Debs. (Reg.)	£33	£35
Major & Co., Ltd. Ord. (5/-)	7½d.	7½d.
,, 8% Part. Prefd. Ord. (10/-)	9d.	9d.
,, 7½% Cum. Pref.	1/6¾	1/6¾
Pinchin, Johnson & Co., Ltd. Ord. (10/-)	48/-	47/-
Potash Syndicate of Germany 7% Gld. Ln. Sr. "A" and "B" Rd.	£80	£79
Reckitt & Sons, Ltd. Ord.	115/-	115/-
Salt Union, Ltd. Ord.	42/6	42/6
,, Pref.	47/6	47/6
South Metropolitan Gas Co. Ord. (£100)	£124/10/-	£124/10/-
Staveley Coal and Iron Co., Ltd. Ord.	52/6	51/3
Stevenson & Howell, Ltd. 6½% Cum. Pref.	26/3	26/3
Triplex Safety Glass Co., Ltd., Ord. (10/-)	95/-	91/3
Unilever, Ltd. Ord.	33/1½	33/1½
United Glass Bottle Manufacturers, Ltd. Ord.	44/-	44/6
United Molasses Co., Ltd. Ord (6/8)	23/1½	23/1½
United Premier Oil & Cake Co., Ltd. Ord. (5/-)	9/9	10/-

Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

MORPHOLINE ETHANOLS and certain ethers thereof, production.—Carbide and Carbon Chemicals Corporation. Dec. 4, 1934. 32262/35.

PYRIDINE-ORTHO-DICARBOXYLIC ACID AMIDES, manufacture.—Soc. of Chemical Industry in Basle. Dec. 5, 1934. 33025/35.

POLYMERIZED HALOPRENES and methods of treating the same.—Boston Blacking Co., Ltd. Dec. 3, 1934. 33242/35.

ALLOYS OF NICKEL AND RHODIUM.—Mond Nickel Co., Ltd. Dec. 5, 1934. 33530/35.

ORGANIC MERCURY-SILICON COMPOUNDS, process for the manufacture.—I. G. Farbenindustrie. Dec. 6, 1934. 33872/35.

CONDENSATION PRODUCTS, process for the manufacture.—I. G. Farbenindustrie. Dec. 6, 1934. 33873/35.

MOULDED POLYMERIZATION PRODUCTS, method of and means for producing.—Röhm and Haas. Dec. 6, 1934. 33887/35.

POLYMERS.—Standard Oil Development Co. Dec. 8, 1934. 34012/35.

Specifications Accepted with Date of Application

ELECTROLYTIC PRODUCTION OF LEAD.—National Processes, Ltd., A. R. Gibson, and S. Robson. Nov. 5, 1934. 448,328.

CARBONISATION AND DISTILLATION OF MIXTURES of oil with coal or like carbonaceous materials. H. P. Stephenson. Aug. 29, 1934. 448,028.

CARBONISATION AND DISTILLATION OF MIXTURES of oil with coal or like carbonaceous materials.—H. P. Stephenson. Aug. 29, 1934. 448,029.

COMPOUNDS OF THE COLROXENE AND COERBIOXENE SERIES, manufacture and production.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). Nov. 22, 1934. 448,180.

BASIC ESTERS OF POLYARYLACETIC ACIDS, manufacture.—A. G. Bloxam (Soc. of Chemical Industry in Basle). Nov. 23, 1934. 448,181.

DYESTUFF-SULPHONIC, manufacture.—W. W. Groves (I. G. Farbenindustrie). Nov. 23, 1934. 448,182.

PHYSIOLOGICALLY ACTIVE DERIVATIVES OF CYCLOPENTANOPHENANTHROL, process for the manufacture.—A. Carpmael (Schering-Kahlbaum). Nov. 23, 1934. 448,183.

SCRAPING OR PLANING OF METAL and other surfaces.—J. E. Malam, and Imperial Chemical Industries, Ltd. Nov. 23, 1934. 448,027.

RECOVERY OF ALUMINIUM COMPOUNDS.—L. Freling, and J. Dorren. Nov. 24, 1934. 448,107.

TARS AND TARRY OILS containing tar acids, distillation.—H. G. C. Fairweather (Barrett Co.). Nov. 27, 1934. 448,109.

RENDERING WATER PRACTICALLY FREE FROM GASES, alkalis, acids, and organic and inorganic admixtures, process.—Dr. K. Glassner, and E. Klausner. Nov. 30, 1934. 448,118.

SILICIC ACID GELS, production.—Grasselli Chemical Co. Dec. 1, 1933. 448,125.

VULCANISATION OF RUBBER.—E. I. du Pont de Nemours and Co. Jan. 11, 1934. 448,126.

CONDENSATION PRODUCTS, manufacture.—I. G. Farbenindustrie. Dec. 2, 1933. 448,242.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Dec. 1, 1933. 448,131.

DEVICES OR INSTRUMENTS for measuring the flow of liquids.—Electroflo Meters Co., Ltd., and F. V. A. E. Engel. Dec. 3, 1934. 448,332.

DEVICES OR INSTRUMENTS for measuring the flow of liquids in open channels or the like.—Electroflo Meters Co., Ltd., and F. V. A. E. Engel. Dec. 3, 1934. 448,333.

PLASTIC COMPOSITIONS containing gelatinized nitrocellulose.—H. J. Tattersall, and Imperial Chemical Industries, Ltd. Dec. 3, 1934. 448,246.

VALUABLE LOW-BOILING HYDROCARBONS from products of the destructive hydrogenation of coals, production.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). Dec. 4, 1934. 448,334.

DYEING LEATHER, process.—Imperial Chemical Industries, Ltd., J. Burchill, and G. S. J. White. Dec. 4, 1934. 448,263.

Applications for Patents

PLANTS FOR HYDROGENATION of hydrocarbonous substances containing sulphur. P. Marecaux. (France, February 26.) (Cognate with 15198). 15199.

HYDROGEN PEROXIDE, production.—H. Schmidt. (Germany, June 22, '35.) 15512.

HYDROCARBON OILS, conversion.—Universal Oil Products Co. (United States, August 7, '35.) 15278.

HYDROCARBON OILS, conversion.—Universal Oil Products Co. (United States, August 9, '35.) 15279.

ORGANIC PRODUCTS, production.—A. Weizmann. 15123.

ELECTROLYTIC DEPOSITION OF CHROMIUM.—W. P. Williams (Rojas Chemical Works, Inc.). 15457.

RESINOUS CONDENSATION PRODUCTS, manufacture.—Beck, Koller, and Co. (England), Ltd. (Germany, June 8, '35.) 16042; (Germany, June 5, '35.) 15650, 15751.

AZO DYESTUFFS, ETC., manufacture.—C. K. Black (E. I. du Pont de Nemours and Co.). 16047.

BENZANTHRONE DERIVATIVES, manufacture.—A. Carpmael (I. G. Farbenindustrie). 15850.

SULPHUR DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 15852.

ACID WOOL DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 16015.

Prices of Chemical Products

WITH the exception of the products mentioned below the prices of British chemical products remain the same as reported in THE CHEMICAL AGE last week (pages 546-547). Unless otherwise stated the prices given cover fair quantities net and naked at sellers' works.

LONDON.—The London chemical market shows no appreciable change and is receiving a steady volume of inquiry. Prices for bichromate of soda and bichromate of potash are now announced for the second six months of 1936 and remain unchanged. A reduction has been made in the price of acetone.

MANCHESTER.—Moderately active trading conditions have been reported on the Manchester chemical market during the past week, both as regards forward buying and business for near delivery dates. In one or two instances the tendency of values this week has been slightly downward, but so far as the general run of heavy chemicals are concerned there has been no departure from the steady conditions that have been in operation for so long. Deliveries of textile chemicals in Lancashire and Yorkshire are reported to be displaying an improving trend, and in most other directions contract specifications, especially for the acid materials and the alkalies, are covering fair quantities. Among the by-products no big weight of business is going through, taking the market as a whole, and for the most part values at the moment are not too strong.

SCOTLAND.—Business in general chemicals has been very quiet during the week, both for home trade and export. Prices, however, continue quite steady at about previous figures, with no changes of importance to report.

General Chemicals

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. LONDON: 11½d. less 5%. SCOTLAND: 1s. 0¼d. less 5%. MANCHESTER: 1s. per lb.

CADMIUM SULPHIDE.—4s. to 4s. 3d. per lb.

CARBON BLACK.—3 11/16d. to 4 13/16d. per lb. LONDON: 4½d. to 5d.

LAMPBLACK.—£28 to £30 per ton.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38

Coal Tar Products

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 2s. 3d. to 2s. 6d. per gal. MANCHESTER: Crystals, 6¾d. per lb.; crude, 2s. 3d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

CREOSOTE.—B.S.I. Specification standard, 5¼d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 4½d. to 5d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.

Pharmaceutical and Photographic Materials

IODINE.—Resub., B.P. 5s. 6d. to 7s. 11d. per lb.

IODOFORM.—B.P. Cryst., Precip. or Powder, 8s. to 10s. 8d. per lb.

POTASS. IODINE.—B.P. 4s. 6d. to 6s. 6d. per lb.

SODIUM IODIDE.—B.P. 5s. 6d. to 7s. 10d. per lb.

Essential Oils

ARAUCARIA.—8s. per lb.

SANDALWOOD.—Australian, B.P. and French Codex 92/95%, 14s. 9d. per lb.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Estonia.—An agent in Tallinn wishes to represent United Kingdom manufacturers of soda and other chemicals, on a commission basis. (Ref. No. 506.)

Estonia.—A firm in Tallinn wishes to represent United Kingdom manufacturers of aniline dyes, chemicals (particularly caustic soda), on a commission basis. (Ref. No. 509.)

Brazil.—A firm in Rio de Janeiro, Brazil, desires to obtain the agency of United Kingdom exporters of chemical and pharmaceutical Products. (Ref. No. 521.)

Spain.—An agent established at Barcelona wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of drugs, chemical products, raw materials for the manufacture of paints and varnishes, and vegetable fibres. (Ref. No. 515.)

Canada.—A firm of manufacturers' agents in Quebec wishes to obtain the representation of United Kingdom exporters of salt (English coarse), and caustic soda (in drums), on a purchasing or commission basis, preferably the latter, for the Province of Quebec. (Ref. No. 499.)

India.—The British Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders (Order No. M-8136) to be presented in India by July 13, for the supply of creosote. Further particulars may be obtained upon application to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. (Ref. No. T.Y 40,104.)

Company News

United Indigo and Chemical Co.—The payment is announced of a final dividend on the 5 per cent. preference shares for the six months ending June 30, 1936.

Boots Pure Drug Co.—The payment of an interim dividend of 6 per cent., less tax, is announced on the ordinary shares, payable on June 30.

British Drug Houses, Ltd.—The quarterly interim dividend of 1¼ per cent. has been declared on the 5 per cent. preference shares, payable on June 30.

English Clays Lovering Pochin and Co.—An interim dividend of 1 per cent., less tax, is announced on the ordinary shares, payable June 15.

Sangers, Ltd.—The directors recommend a final dividend of 16¼ per cent. (actual), making 25 per cent. for the year to March 31, 1936, against 22½ per cent. for the previous year.

International Combustion Ltd.—The directors have declared a first interim dividend of 7½ per cent., less tax, on the ordinary shares. Profit for the year ended September 30, 1935, amounted to £114,800, having risen from £48,910 in the previous year.

Bradford Dyers' Association, Ltd.—The directors have decided to pay the interest on the 4 per cent. debenture stock, as usual, on July 1, but to postpone the dividend on the 5 per cent. cumulative preference stock for the six months ending June 30, 1936. The preference dividend is paid to December 31, 1932.

"Sanitas" Trust.—The net profit for the year to May 30, 1936, amounted to £57,980 (against £57,996), plus £14,099 brought in, making £72,079, less dividends on preference shares, £49,500, leaving £22,579. To general reserve is placed £5,000 (£1,081 written off capital reorganisation expenses). The dividend is 1d. per 1s. share, tax free, leaving to go forward, £13,496.

"Shell" Transport and Trading Co., Ltd.—A sharp rise in profits is shown in the accounts. In 1935, receipts at £5,067,195 reached the highest level since 1930, when the amount received was £5,071,415. Last year's figure represents an increase of £1,214,591 on the total for 1934. The year's ordinary dividend is increased from 12½ per cent. to 17½ per cent., tax free.

Port Said Salt Association, Ltd.—A distribution of 2s. 3d. per share is being paid to shareholders. This amount is rendered available by reason of the reduction and re-imbursement of capital of United Egyptian Salt, Ltd., in which the company is interested. The amount is payable forthwith on presentation and delivery up of Coupon 60 at the Crédit Lyonnais, either in Alexandria or in London.

W. J. Bush and Co.—The net profit for 1935 was £98,362, to which is added £94,625 brought forward, less amount required for dividends on preference shares and £12,104 provisions for tax and exchange, leaving £174,633. A final dividend of 8 per cent. is announced on the ordinary shares, making 13 per cent. for the year, £32,500, off goodwill, £20,000; to reserve against possible plant obsolescence, £10,000; to reserve against freehold works, £10,000; leaving to go forward, £102,133.

New Companies Registered

James Crean and Son (1936), Ltd.—Registered June 8. Nominal capital, £100,000. Dealers in and brokers, manufacturers, refiners and bleachers of oils, tallows, greases, lard and its compounds, etc. Directors:—Harold E. Crean, St. Annes, Cowper Drive, Rathmines, Dublin; Peter L. McCarthy, George D. Findlater.

Chas. Forth and Son, Ltd.—Registered June 11. Nominal capital, £10,000. To acquire the business of a chemical manufacturer carried on by Eric Forth as "Chas. Forth and Son," at North Gate, New Basford, Nottingham. Directors:—Eric Forth and Jane H. Forth.

F. P. Linden and Co., Ltd.—Registered June 10. Nominal capital, £500. Manufacturers of and dealers in disinfectants, salts, acids, preserving fluids, chemical, surgical, laboratory and scientific furniture and equipment, etc. Directors:—Edgar L. Oates, Crookes House, Sackville Road, Sheffield; Frank H. Oates.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

SAUNDERS VALVE CO., LTD., Wolverhampton. (M., 20/6/36.) Registered June 2, debentures, to Lloyds Bank, Ltd. securing all moneys due or to become due to the Bank; general charge. *£2,500. June 12, 1935.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

PATTINSON — (male), (trading as Cement Industries), 200 Siddals Road, Derby, colour merchant. (C.C., 20/6/36.) £18 13s. 4d. May 6.

ECCLES, J., AND CO. (firm), Dalton Chemical Works, Blackburn, manufacturers. (C.C., 20/6/36.) £13 14s. 8d. May 11.

THORNFIELD, Mr. G. (trading as Beaucaire Laboratories), 14 America Square, E.C., chemist. (C.C., 20/6/36.) £19 12s. May 15.

S. C. & M. (Chemicals)

Declaration of Solvency

A declaration of solvency was filed on June 5, 1936, relating to S. C. & M. (Chemicals), Ltd., which was registered as a "private" company on February 9, 1934, to acquire from the Gas Syndicate, Ltd., a licence relating to certain industrial processes and the user thereof, with the benefit of the patents and other protections thereof, and to carry on the business of technical, industrial, wholesale, retail, manufacturing, consulting and research chemists, etc. The authorised capital is £66,000. The shareholders at the date named included: Arthur Burns, Gas Syndicate, Ltd., and Spencer Chapman and Messel, Ltd. The registered office is at Walsingham House, Seething Lane, London, E.C.3.

Books Received

Tables of Physical and Chemical Constants and Some Mathematical Functions. By G. W. C. Kaye and T. H. Laby. London: Longmans Green and Co. Pp. 162. 14s.

Darkening of Lac Solutions and the Effect of Oxalic Acid Thereon. By Lal C. Verman and R. Bhattacharya. Technical Paper No. 8. London Shellac Research Bureau, India House, Aldwych, London.